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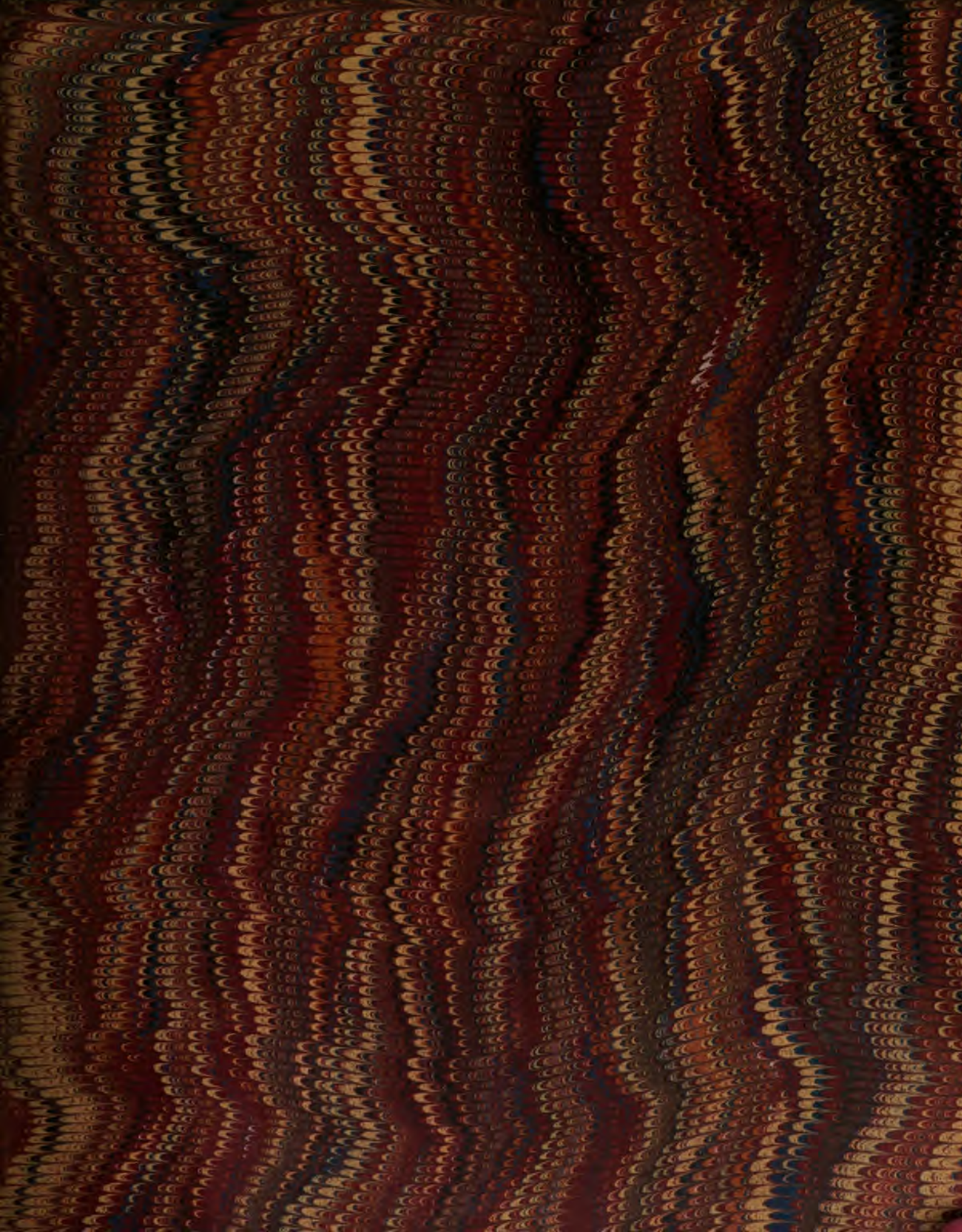

TRANSACTIONS

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ERRATA.

Page 10, line 3, for "*aretica*" read "*arctica.*"
Page 22, line 11, *add* "See TAB. I."
Page 34, line 1, *for* "Pultney's" *read* "Pulteney's."
——— line 16, *for* "Theirlheld" *read* "Threlkeld."
Page 64, line 7 from the bottom, for "*periſtomia*" read "*periſtoma.*"
Page 96, line 16, for "*Barraka*" read "*Parraka.*"

TRANSACTIONS

OF THE

LINNEAN SOCIETY.

I. *Aves Suſſexienſes*; or, *A Catalogue of Birds found in the County of Suſſex, with Remarks, by William Markwick, Eſq. F. L. S.*

Read May 5, 1795.

Division I. LAND BIRDS.

Order I. *Rapacious.*

Genus I. Falcon.

1 *** Golden Eagle. *Falco Chryſaetos.*

Several years ago I ſaw a bird of this ſpecies, which was killed at Bexhill in this neighbourhood.

2 Common Buzzard. *Falco Buteo.*

3 Moor Buzzard. *Falco æruginoſus.*

4 Kite. *Falco Milvus.*

5 Peregrine Falcon. *Falco peregrinus.*
A bird of this ſpecies was lately living in a gentleman's garden at Lewes: it was taken when young in the neighbourhood.

6 Henharrier. *Falco cyaneus.*
Ringtail. *Falco Pygargus.*

7 Keſtril. *Falco Tinnunculus.*

8 Sparrow Hawk. *Falco Niſus.*

9 Hobby. *Falco Subbuteo.*

10 Merlin. *Falco Æſalon.*

11 *** Minute Falcon. *Falco minutus?*
On the 6th of September 1784 I ſhot a ſmall hawk which I ſuppoſed to be this bird.

12 *** Dark brown Hawk, or Buzzard.
This was alive in the garden at Denn in 1793.

GENUS II. Owl.

* Eared Owls.

13 *** Long-eared Owl. *Strix Otus.*
I never ſaw this bird myſelf, but am informed that it has been found here.

** with ſmooth heads.

14 White Owl. *Strix flammea.*

15 Tawny Owl. *Strix ſtridula.*

16 Brown Owl. *Strix Ulula.*

ORDER II. *Pies.*

GENUS III. Shrike.

17 ** Red-backed Shrike. *Lanius Collurio.*

GENUS

GENUS IV. Crow.

18 Raven. *Corvus Corax.*
19 Carrion Crow. *Corvus Corone.*
20 Rook. *Corvus frugilegus.*
21 ** Hooded or Royſton Crow. *Corvus Cornix.*
22 Jack-daw. *Corvus Monedula.*
23 Jay. *Corvus glandarius.*
24 Magpie. *Corvus Pica.*
25 Red-legged Crow. *Corvus Graculus.*

GENUS V. Roller.

26*** Garrulous Roller. *Coracias Garrula.*

A bird of this ſpecies was killed in this neighbourhood.

GENUS VI. Cuckoo.

27 * Common Cuckoo. *Cuculus canorus.*

GENUS VII. Wryneck.

28 * Wryneck. *Jynx Torquilla.*

GENUS VIII. Woodpecker.

29 Green Woodpecker. *Picus viridis.*
30 Greater ſpotted Woodpecker. *Picus major.*
31 Leſſer ſpotted Woodpecker. *Picus minor.*

I believe this ſpecies is rare. Many years ago I ſhot one; but have not ſeen it ſince.

GENUS IX. Kingsfiſher.

32 Common Kingsfiſher. *Alcedo Iſpida.*

GENUS X. Nuthatch.

33 European Nuthatch. *Sitta europæa.*

GENUS XI. Hoopoe.

34*** Common Hoopoe. *Upupa Epops.*

GENUS XII. Creeper.

35 Common Creeper. *Certhia familiaris.*

ORDER III. *Paſſerine.*

GENUS XIII. Stare.

36 Common Stare. *Sturnus vulgaris.*

GENUS XIV. Thruſh.

37 Miſſel Thruſh. *Turdus viſcivorus.*
38 Throſtle. *Turdus muſicus.*
39 ** Redwing. *Turdus iliacus.*
40 ** Fieldfare. *Turdus pilaris.*
41 Blackbird. *Turdus Merula.*
42 *** Ring Ouzel. *Turdus torquatus.*
43 *** Roſe-coloured Thruſh. *Turdus roſeus.*
This bird was killed at Eaſt Bourn, and ſent to Sir Aſhton Lever's Muſeum, as I was informed.

GENUS XV. Chatterer.

44 *** Waxen Chatterer. *Ampelis Garrulus.*

GENUS XVI. Groſbeak.

45 *** Common Croſsbill. *Loxia Curviroſtra.*
46 *** Hawfinch. *Loxia Coccothrauſtes.*
47 Bullfinch. *Loxia Pyrrhula.*
48 Greenfinch. *Loxia Chloris.*

GENUS XVII. Bunting.

49 *** Snow Bunting. *Emberiza nivalis.*
I have ſeen one ſpecimen of this bird, killed here in a hard winter.
50 Yellowhammer. *Emberiza Citrinella.*
51 Common Bunting. *Emberiza Miliaria.*
52 Reed Sparrow. *Emberiza Schæniclus.*

GENUS

GENUS XVIII. Finch.

53 Houſe Sparrow. *Fringilla domeſtica.*
54 Chaffinch. *Fringilla cælebs.*
55 *** Brambling. *Fringilla Montifringilla.*
56 Goldfinch. *Fringilla Carduelis.*
57 *** Siſkin. *Fringilla Spinus.*
58 Linnet. *Fringilla Linota.*

GENUS XIX. Flycatcher.

59 * Spotted Flycatcher. *Muſcicapa Griſola.*
60 Coldfinch. *Muſcicapa atricapilla.*
I think I once ſaw this bird ſitting on the walls of the old caſtle at Winchelſea.

GENUS XX. Lark.

61 Sky Lark. *Alauda arvenſis.*
62 Wood Lark. *Alauda arborea.*
63 Tit Lark. *Alauda pratenſis.*
Seen here in ſummer only.
64 ** Leſſer Tit Lark. *Alauda trivialis.*
Seen here in winter only, and then in flocks together.

GENUS XXI. Wagtail.

65 White Wagtail. *Motacilla alba.*
66 Grey Wagtail. *Motacilla Boarula.*
67 Yellow Wagtail. *Motacilla flava.*

GENUS XXII. Warbler.

68 * Nightingale. *Sylvia Luſcinia.*
69 * Pettychaps. *Sylvia hortenſis.*
70 * Black-cap. *Sylvia atricapilla.*
71 Hedge-ſparrow. *Sylvia modularis.*
72 * Redſtart. *Sylvia Phœnicurus.*
73 * White-throat. *Sylvia cinerea.*

74 Sedge Warbler. *Sylvia ſalicaria.*
75 Red-breaſt. *Sylvia Rubecula.*
76 Stone-chat. *Sylvia Rubicola.*
77 * Whin-chat. *Sylvia Rubetra.*
78 * Wheat-ear. *Sylvia Oenanthe.*
79 Wren. *Sylvia Troglodytes.*
80 Gold-creſted Wren. *Sylvia Regulus.*
81 * Willow Wren. *Sylvia Trochilus.*

GENUS XXIII. Titmouſe.

82 Great Titmouſe. *Parus major.*
83 Blue Titmouſe. *Parus cæruleus.*
84 Colemouſe. *Parus ater.*
85 Marſh Titmouſe. *Parus paluſtris.*
86 Long-tailed Titmouſe. *Parus caudatus.*

GENUS XXIV. Swallow.

87 * Houſe Swallow. *Hirundo ruſtica.*
88 * Martin. *Hirundo urbica.*
89 * Sand Martin. *Hirundo riparia.*
90 * Swift. *Hirundo Apus.*

GENUS XXV. Goatſucker.

91 * European Goatſucker. *Caprimulgus europæus.*

ORDER IV. *Columbine.*

GENUS XXVI. Pigeon.

92 Common Pigeon. *Columba Oenas.*
Seen here only in the domeſtic ſtate; but I have been informed, that they are found in the wild ſtate in the weſtern part of this county.
93 Ring Dove. *Columba Palumbus.*

94 * Com-

94 * Common Turtle. *Columba Turtur.*
Seen here only in the ſummer, generally two together; but not very common.

ORDER V. *Gallinaceous.*

GENUS XXVII. Peacock.

95 Peacock. *Pavo criſtatus.*
Only in a domeſtic ſtate.

GENUS XXVIII. Turkey.

96 Common Turkey. *Meleagris Gallopavo.*
Only in a domeſtic ſtate.

GENUS XXIX. Pintado.

97 Pintado, or Guinea Hen. *Numida Meleagris.*
Only in a domeſtic ſtate.

GENUS XXX. Pheaſant.

98 Common Barn-door Fowl. *Phaſianus Gallus.*
Only in a domeſtic ſtate.

99 Common Pheaſant. *Phaſianus colchicus.*

GENUS XXXI. Grous.

100 Black Grous. *Tetrao Tetrix.*
I have ſeen this ſpecies on St. Leonard's foreſt near Horſham.

GENUS XXXII. Partridge.

101 Common Partridge. *Perdix cinerea.*

102 * Common Quail. *Perdix Coturnix.*

GENUS XXXIII. Buſtard.

103 Common Buſtard. *Otis Tarda.*
Sometimes ſeen on our South Downs.

104 * Thick-knee'd Buſtard. *Otis oedicnemus.*

DIVISION

DIVISION II. WATER BIRDS.

ORDER VI. *With cloven Feet.*

GENUS XXXIV. Heron.

105 Common Heron. *Ardea cinerea.*
106 Bittern. *Ardea ſtellaris.*

GENUS XXXV. Curlew.

107 Common Curlew. *Numenius Arquata.*
108 Whimbrel. *Numenius Phæopus.*

GENUS XXXVI. Snipe.

109 ** Woodcock. *Scolopax Ruſticola.*
110 *** Great Snipe. *Scolopax major.*
I have ſeen one of this ſpecies which was killed near Horſham.
111 ** Common Snipe. *Scolopax Gallinago.*
112 ** Jack Snipe. *Scolopax Gallinula.*
113 *** Red Godwit. *Scolopax lapponica.*
114 Redſhank. *Scolopax Calidris.*
115 Common Godwit. *Scolopax leucophæa.*

GENUS XXXVII. Sandpiper.

116 Lapwing. *Tringa Vanellus.*
117 *** Grey Plover. *Tringa Squatarola.*
118 Green Sandpiper. *Tringa Ochropus.*
Wood Sandpiper. *Tringa Glareola.*
119 Common Sandpiper. *Tringa Hypoleucos.*
120 Sea Sandpiper. *Tringa maritima.*
121 ** Purre. *Tringa Cinclus.*
122 Dunlin. *Tringa alpina.*
123 ** Small grey Sandpiper. *Tringa arenaria.*

GENUS XXXVIII. Plover.

124 Golden Plover. *Charadrius pluvialis.*
125 * Sea Lark. *Charadrius Hiaticula.*
126 ** Sanderling. *Charadrius Calidris.*

GENUS XXXIX. Oyſter-catcher.

127 Common Oyſter-catcher. *Hæmatopus oſtralegus.*

GENUS XL. Rail.

128 Water Rail. *Rallus aquaticus.*

GENUS XLI. Gallinule.

129 * Land Rail. *Gallinula Crex.*
130 Common Water-hen. *Gallinula chloropus.*
131 *** Spotted Gallinule. *Gallinula Porzana.*
This bird was once ſhot by the ſide of a mill-pond in this neighbourhood.

ORDER VII. *With pinnated Feet.*

GENUS XLII. Coot.

132 Common Coot. *Fulica atra.*

GENUS XLIII. Grebe.

133 *** Tippet Grebe. *Podiceps criſtatus.*
134 *** Eared or leſſer creſted Grebe. *Podiceps auritus.*

ORDER VIII. *Web-footed,*

* with long legs.

GENUS XLIV. Avoſetta.

135 Avoſetta. *Recurviroſtra avoſetta.*

** with ſhort legs.

GENUS XLV. Auk.

136 Puffin. *Alca arctica.*
137 Razor-bill. *Alca Torda.*
138 Black-billed Auk. *Alca Pica.*

GENUS XLVI. Diver.

139 Guillemot. *Colymbus Troille.*
140 Speckled Diver. *Colymbus ſtellatus.*

GENUS XLVII. Tern.

141 * Greater Tern. *Sterna Hirundo.*
142 * Leſſer Tern. *Sterna minuta.*
143 * Black Tern. *Sterna fiſſipes.*

GENUS XLVIII. Gull.

144 Black and white Gull. *Larus marinus.*
145 Wagel. *Larus nævius.*
146 Common Gull. *Larus canus.*
147 Black-headed Gull. *Larus ridibundus.*
148 ** Winter Mew. *Larus hybernus.*
149 Skua. *Larus cataractes.*

I am much miſtaken if I have not ſeen this gull on our coaſt.

150 Parrock Gull. *Larus tridactylus.*

I had one of theſe in my poſſeſſion: it was caught alive in a hard froſt near my houſe, and I have ſince ſeen it on the ſea-ſhore.

GENUS XLIX. Merganſer.

151 *** Dun Diver. *Mergus Caſtor.*
152 *** Red-breaſted Gooſander. *Mergus Serrator.*
153 *** Minute Merganſer. *Mergus minutus.*

154 Smew. *Mergus Albellus.*
I never met with this bird, but have heard it called the Magpie Diver; ſo that I ſuppoſe it is ſometimes ſeen on this coaſt.

GENUS L. Duck.

155 *** Wild Swan. *Anas Cygnus.*
Sometimes killed on our coaſt in hard winters.
156 Tame Swan. *Anas Olor.*
157 Canada Gooſe. *Anas canadenſis.*
Seen in the river at Horſham in a domeſtic ſtate.
158 Wild Gooſe. *Anas Anſer ferus.*
Tame Gooſe. *Anas Anſer domeſtica.*
159 *** Laughing Gooſe. *Anas albifrons.*
Sometimes killed on our coaſt in hard winters.
160 *** Bean Gooſe. *Anas Segetum.*
161 *** Bernacle. *Anas erythropus.*
One of this ſpecies was killed on our coaſt in the hard winter 1789.
162 Brent Gooſe. *Anas Bernicla.*
Seen in a domeſtic ſtate.
163 Muſcovy Duck. *Anas moſchata.*
Seen in a domeſtic ſtate.
164 Chineſe Gooſe. *Anas cygnoides.*
Seen in a domeſtic ſtate.
165 Scoter or Black Duck. *Anas nigra.*
Sometimes ſeen in great flocks at ſea, not far from ſhore.
166 Common Wild Duck. *Anas Boſchas.*
Tame Duck. *Anas Boſchas domeſtica.*
167 ** Scaup Duck. *Anas Marila.*
Killed on our coaſt in 1789.

168 Shieldrake. *Anas Tadorna.*
169 ** Wigeon. *Anas Penelope.*
170 ** Pochard. *Anas ferina.*
171 ** Pintail Duck. *Anas acuta.*
172 ** Golden Eye. *Anas Clanguka.*
173 Teal. *Anas Crecca.*

GENUS LI. Pelican.

174 Corvorant. *Pelecanus Carbo.*
175 *** Gannet. *Pelecanus baſſanus.*
Once ſhot in this neighbourhood.

N. B. One aſteriſk (*) immediately after the number affixed to the bird, ſignifies a ſummer bird of paſſage; two aſteriſks (**) a winter bird of paſſage; and three (***) an occaſional viſitor, or bird whoſe migration is irregular and uncertain. The reſt, without any aſteriſk, are ſuppoſed to be reſident here in this iſland, throughout the whole year.

NOTES, *or* REMARKS, *on the foregoing* CATALOGUE.

No. 6.—Henharrier. *Falco cyaneus.*
Ringtail. *Falco Pygargus.*

SEVERAL years ago I ſhot two of the blue grey Hawk, or Henharrier, which differed conſiderably in the colour of their plumage. The firſt was of a light aſh-colour, marked with reddiſh oblong ſpots on the breaſt and hinder part of the head, like the figure in the folio edition of the Britiſh Zoology; the other had none of theſe

theſe oblong reddiſh ſpots, either on the breaſt or hinder part of the head, but was all over of the ſame pale aſh-colour, becoming gradually lighter on the under ſide to the belly, which was white. This induced me to conclude (perhaps too haſtily) that theſe two birds were male and female of the ſame ſpecies, and that the brown hawk, with a white rump or ring-tail, was a different ſpecies; but a gentleman in this neighbourhood lately informed me, that his game-keeper, ſome time laſt ſummer, killed both the Hen-harrier and the Ringtail from the ſame neſt, and that there is no doubt of their being male and female of the ſame ſpecies. If ſo, the difference in the colour of my two birds muſt ariſe from their different ages; the firſt, with reddiſh ſpots, being, as I ſuppoſe, the youngeſt, and ſtill retaining ſomewhat of the ferruginous colour of the Ringtail; the other, which was all over of a light aſh-colour, I ſuppoſe to have been an old bird, and had attained to its full colour.

No. 12.—Dark brown Hawk or Buzzard.

In the winter 1792, two of theſe birds were obſerved to frequent the high trees in Denn Park, in purſuit of the rooks. One of them was taken, and kept alive in the garden, where I found it, and made a drawing and deſcription of it. If it is not a variety of the Moor Buzzard, *Falco æruginoſus*, it probably is a new Britiſh ſpecies; for I cannot find, either in Mr. Pennant's or Mr. Latham's works, any deſcription that perfectly agrees with it. It ſeems to me to be of leſs dimenſions, of a more ſlender make, and more active than the Moor Buzzard: but, as I never had this latter bird in my poſſeſſion, I cannot form a proper judgment upon it.

No. 21.—Hooded or Royſton Crow. *Corvus Cornix.*

This bird is, with reſpect to us, a bird of paſſage, being ſeen only in the winter, and then only near the ſea-ſide. On the 30th of

of March 1790, as I was walking in my land, which is about four miles diſtant from the ſea-ſhore, I ſaw, what I thought had the appearance of migration in theſe birds, a ſmall flock of them (leſs than twenty in number), having paſſed ſteadily by me from the ſea towards the north.

No. 25.—Red-legged Crow. *Corvus Graculus.*

This bird frequents the South Downs about Beachy Head and Eaſt Bourn, where it is called the Red-billed Jack-daw.

No. 26.—The Roller. *Coracias Garrula.*

This uncommon bird was killed in our neighbourhood: I made a drawing from its ſkin, which differed, in ſome reſpects, from Mr. Edward's figure; whence I had reaſon to think that mine was a young bird of the preceding year, driven acroſs the ſea into this iſland by the ſtormy weather which prevailed about that time.

No. 27.—The Cuckoo. *Cuculus canorus.*

The old birds of this ſpecies leave us when they ceaſe to ſing, which is about the latter end of June; but the young ones are ſometimes ſeen very late in the autumn,—as late as the 28th of September.

No. 34.—The Hoopoe. *Upupa Epops.*

I once had this beautiful bird alive in my poſſeſſion; and, at another time, one of theſe birds flew before my horſe, near Eaſt Bourn in this county, and ſuffered me to approach near enough to diſtinguiſh its colour, and even its creſt, though it carried the latter folded up as it flew. From what I could obſerve in both theſe birds, it ſeems to reſemble the Jay in its habits, particularly in its note or ſcreech, and in its manner of flying.

No. 44.—The Chatterer. *Ampelis Garrulus.*

This rare bird ſometimes makes its appearance here in hard winters: I have met with two inſtances of it.

No. 45.—The Croſs-bill. *Loxia Curviroſtra.*

I have known two or three inſtances of this bird being killed in the neighbourhood. A male bird of this ſpecies was ſent me by a friend on the 15th of January 1795.

No. 46.—The Hawfinch. *Loxia Coccothrauſtes.*

Two inſtances of this bird's being met with here, in hard winters, have fallen within my obſervation.

No. 54.—The Chaffinch. *Fringilla cælebs.*

Mr. White, in his Natural Hiſtory of Selborne, aſſerts, that only the hen Chaffinches are to be ſeen in winter at that place; or, at moſt, but very few cocks among them. Such a circumſtance (which confirms Linnæus's account of the migration of the female Chaffinches only) happening ſo near to this place as the very next county, has induced me to take particular notice of theſe birds, eſpecially in the winter. Not long ſince, as I was riding, I obſerved a number of Chaffinches in the hedges on each ſide of the road, and, as far as I could diſtinguiſh, moſt of them appeared to be cocks. I now began to think that I had diſcovered ſome traces of this partial migration, and that the hens were gone, and had left their mates behind them: but my ſubſequent obſervations have not tended to confirm this idea; for, ſince that time, I have ſeen at leaſt as many hens as cocks; particularly on the 22d of this month, January 1795, nineteen of theſe birds were killed and brought to me. On examination, there proved to be ten females and nine males; ſo that I muſt revert back to my original opinion, that no ſuch partial migration of one ſex only takes place here.

No. 55.—The Brambling. *Fringilla Montifringilla.*

This bird is ſometimes driven hither (as I ſuppoſe) by the ſeverity of the winter in more northern countries. I have met with a few inſtances of it in very hard winters.

No. 57.—The Siſkin. *Fringilla Spinus.*

The viſits of this bird to us in this neighbourhood ſeem to be very irregular and uncertain. Some years ago, I ſaw it ſeveral times, in the month of April only, frequenting ſome fir-trees near my houſe, as may be ſeen in my Table publiſhed in the Firſt Volume of the Linnean Tranſactions; but for theſe laſt fourteen years I have never ſeen it once.

No. 59.—The ſpotted Flycatcher. *Muſcicapa Griſola.*

The chief food of this bird being flies, it does not make its appearance here till late in the ſpring,—never before May. A pair of theſe birds have conſtantly built their neſt, every year, in the ſame hole of the wall of my houſe, for a great number of years; which leaves but little room to doubt, that the ſame individual birds return every year to the ſame place to build their neſt. From whence do they come? Do they come from a far diſtant country (lying perhaps on the other ſide the equator), and repair annually to the ſame identical ſpot for the purpoſe of incubation? or, Do they, at the proper ſeaſon of the year, come out from their hiding-place near at hand, where they have paſſed the winter in a torpid ſtate, ſecure from the ſeverity of that ſeaſon?

No. 69.—The greater Pettychaps. *Sylvia hortenſis.*

I have had two birds in my poſſeſſion, which, from their ſize, I am perſuaded were of this ſpecies: there was ſome difference in their colour, one being of a more olivaceous green than the other; and

and alſo in their ſize, but both of them, were larger than the common Pettychaps, *Sylvia Hippolais.*

No. 74.—The Sedge Warbler. *Sylvia ſalicaria.*

This bird is ſeen here only in the ſummer, and is then not very common; it is a very lively active bird, which frequents the reeds near ponds, and ſings very prettily.

No. 78.—The Wheat-ear. *Sylvia Oenanthe.*

This little bird, which is found in great plenty on our South Downs, is juſtly eſteemed a great delicacy for the table, and vaſt numbers of them are annually caught in traps by the ſhepherds as they tend their flocks. Theſe Wheat-ear traps conſiſt of horſe-hair nooſes, placed under a ſod of turf dug out of the ground for that purpoſe. They are firſt ſet up every year on St. James's day, the 25th of July, ſoon after which time they are caught in numbers truly aſtoniſhing, when we reflect that it is a ſolitary bird, more than two or three being ſcarcely ever ſeen together. Obſerving that all the birds which were caught in the proper ſeaſon had the ſame coloured plumage as the hen bird, I made ſome enquiries reſpecting them of a ſhepherd at East Bourn, who informed me, that the flights conſiſted chiefly of young birds, which arrived in the greateſt numbers when a weſterly wind prevailed, and that they always came againſt the wind. He told me that on the 15th and 16th of Auguſt 1792 he caught twenty-ſeven dozen with only a few old birds amongſt them; but this is a ſmall number when compared with the almoſt incredible quantity ſometimes taken. A Gentleman informed me, that his father's ſhepherd once caught eighty-four dozen in one day. Early in the ſpring only a few old birds are to be ſeen, and none (that I could ever obſerve) in the winter. I enquired of the ſhepherd whether theſe birds breed on the South Downs: the anſwer was, A few only.

No. 80.—The Gold-creſted Wren. *Sylvia Regulus.*

This, I believe, is the ſmalleſt bird in Europe; yet, notwithſtanding its diminutive ſize, it is able to brave our ſevereſt winters, as I have before obſerved. Being very ſmall, fond of ſolitude, and living chiefly in the woods, it is not often obſerved; but I am inclined to think that theſe birds abound in greater numbers than is generally ſuppoſed, becauſe, on the 4th of January 1792, I counted eight or nine of them playing about in a ſhort cut copſe within my ſight at the ſame time. In ſummer it ſings very prettily; its note is weak, as may be ſuppoſed from its ſize, but melodious. Where and how it breeds, I know not, having never ſeen its neſt.

No. 81.—The common Willow Wren. *Sylvia Trochilus.*

I have not yet been able to aſcertain the three different varieties of this bird mentioned by Mr. White in his Natural Hiſtory of Selborne. I have more than once ſhot it in the very act of uttering its ſibilous ſhivering note, ſpoken of by that Gentleman; but when I got it into my poſſeſſion, inſtead of being his largeſt Willow Wren, it proved to be the common kind, or *Motacilla Trochilus* of Linnæus. It is an elegant, lively, active little bird, which is very common here in the ſummer; and I once found its neſt at the bottom of a furze buſh.

No. 86.—The long-tailed Titmouſe. *Parus caudatus.*

Theſe birds are ſeen in ſmall flocks or companies together in the winter time, flying from bough to bough in the woods and hedges.

No. 89.—The Sand Martin. *Hirundo riparia.*

Not far from my houſe is a ſand-pit, where theſe birds have made many holes, and build their neſts every year. By frequently viſiting

viſiting this pit in the ſpring, I have pretty accurately aſcertained the time of their arrival, or firſt appearance, to be early in the month of May. In the year 1789 none were to be ſeen on the 28th of April, but on the 6th of May ſeveral were flying about the holes. In 1790, on the 8th of May none were to be ſeen, but on the 12th of the ſame month ſeveral made their appearance. In 1791 I viſited the pit on the 5th and 7th of May, but could diſcover no birds; yet on the 10th, when I viſited it again, ſeveral were flying about. Since that time my further obſervations have been prevented by ſome Houſe Sparrows having taken poſſeſſion of the holes, and driven away the Sand Martins.

No. 90.—The Swift. *Hirundo Apus.*

During my reſidence at Eaſt Bourn in the year 1792 I had an opportunity of marking the time of the departure or diſappearance of theſe birds with ſome accuracy. I lodged near the church, round which building I uſed conſtantly to ſee them playing on the wing till the 10th of Auguſt, after which day not one was to be ſeen.

No. 102.—The Quail. *Perdix Coturnix.*

Theſe birds undoubtedly breed on our South Downs, and in the autumn are found by the ſportſmen in the ſtubbles in bevies or broods ſeveral together. It is probable that moſt of them migrate; but that they do not all leave this country I can aver, for I well remember, that, in company with a friend, we found three or four brace of quails in one morning in the middle of winter (about Chriſtmas) in a field of turneps at Eaſt Bourn.

No. 104.—The thick-kneed Buſtard. *Otis oedicnemus.*

It is called here the Stone Curlew, and breeds on the South Downs, where its whiſtling note is frequently heard in a ſummer's

evening. That moſt of theſe birds leave us in the autumn is moſt probable; but I have known one inſtance of its having been killed here in the winter.

No. 105.—The common Heron. *Ardea cinerea.*

Herons frequent our marſhes and ſides of ponds in ſearch of their food. They probably come hither from Penſhurſt Park in Kent, where there is a large Heronry; and vaſt numbers of their neſts are to be ſeen in ſome very large tall beech-trees,—often many neſts in one tree.

No. 106.—The Bittern. *Ardea ſtellaris.*

This bird is ſometimes met with here, and in the ſpring is frequently heard to blow or make a loud hollow ſound. This ſound has been ſuppoſed from the bird's putting its bill into the hollow of a reed: this I ſuſpect to be a vulgar error, and rather think that it is the call of love uttered, in the ſpring, by the male, to invite the female to him. I once ſhot one of theſe birds in froſty weather: it fell on the ice, which was only ſtrong enough to ſupport my dogs, and they immediately ruſhed forwards to attack, but, being only wounded, it defended itſelf ſo vigorouſly with its ſharp-pointed bill, that not a dog would touch it, till I fired again and killed it.

No. 107.—The common Curlew. *Numenius Arquata.*

This bird is to be met with on our ſea-coaſt, both in ſummer and winter.

No. 108.—The Whimbrel. *Numenius Phæopus.*

This bird is not ſo common as the foregoing ſpecies; I have met with only one inſtance of its being found here.

No. 110.

No. 110.—The Great Snipe. *Scolopax major.*

On the 1ſt of October 1793 I received this bird from a friend. I have no doubt of its being the *Scolopax major* of Mr. Latham, although it was inferior in ſize and weight, and differed ſomewhat in colour from that Gentleman's deſcription; perhaps mine was a young bird.

No. 113.—The Red Godwit. *Scolopax lapponica.*

Theſe birds are ſometimes found on our ſea-coaſt in great numbers. Many years ago, two perſons fired amongſt a flock of them, and killed ten: theſe were brought to me, and I made drawings from them; but have not ſeen one of the ſpecies ſince.

No. 115.—The common Godwit.—*Scolopax leucophæa.*

I believe this bird is not often met with here. The only one I ever ſaw, was one that I ſhot on the ſea-coaſt at Bexhill on the 22d of September 1792; and I ſuſpect that to have been a young bird, becauſe it was of a very light colour, and its meaſurements were far ſhort of Mr. Latham's. It was boring into the mud with its bill in ſearch of food when I ſhot it.

No. 117.—The Grey Plover. *Tringa Squatarola.*

This bird is ſeen on our ſea-coaſts only in the winter, and then but ſeldom. I have ſeen only one, which was killed on the 13th of January 1776 by the ſea-ſide at Bexhill.

No. 118.—The Green Sandpiper. *Tringa Ochropus.*
The Wood Sandpiper. *Tringa Glareola.*

Theſe birds agree ſo nearly in ſize, mode of living, and other reſpects, that they are with the greateſt probability ſuppoſed to be only varieties of the ſame ſpecies, perhaps male and female. A

few of theſe birds frequent the banks of the river at Horſham, and in 1793 I was in hopes that I ſhould be able to aſcertain whether it were ſo or not; but I could procure only one of them, which proved to be the *Tringa Ochropus*. The *Tringa Glareola* is deſcribed in the Firſt Volume of the Linnean Tranſactions.

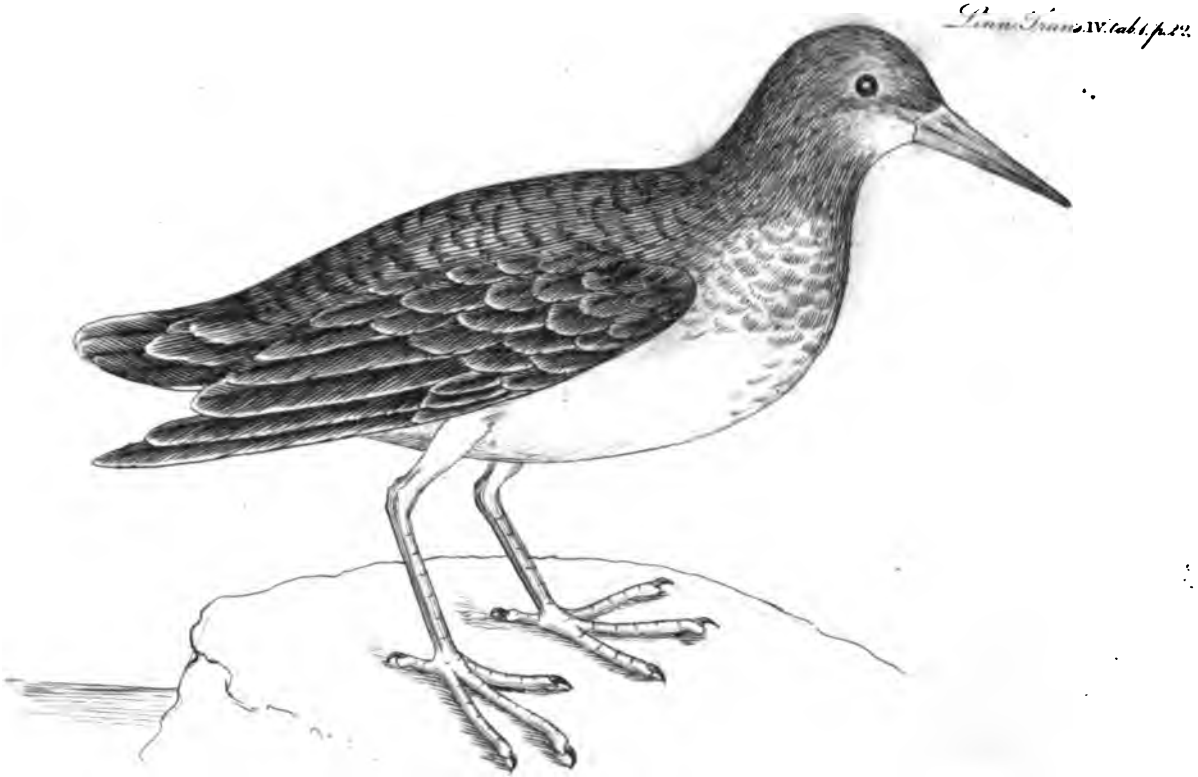
No. 119.—The common Sandpiper. *Tringa Hypoleucos.*

This is a ſolitary bird, frequenting the ſides of ponds and rivulets. I never had but one in my poſſeſſion, and that I ſhot by the ſide of a large mill-pond in the year 1773.

No. 120.—The Sea Sandpiper. *Tringa maritima. Lath. Orn.* 11. *p.* 731. *n.* 18.

On the 8th of December 1796 a ſmall flock, conſiſting of ten or twelve of theſe birds, were ſeen on the ſea-coaſt near Bexhill: two of them were ſhot and brought to me.

Its length from the tip of the bill to the end of the tail is eight inches and an half; its breadth from tip to tip of the wings when extended, fifteen inches and an half. Its bill is an inch and a quarter long, yellow from the baſe half way, and the tip black. Its weight is two ounces and an half. The head, neck, ſhoulders and back are of a dark duſky aſh-colour, with the edges of each feather on the back ſomewhat lighter: the prime quill feathers of the wings are duſky, with their ſhafts white, particularly the firſt: the ſecondary quills are lighter, with white tips; and the hindermoſt are almoſt white, having only one duſky ſpot. The tail is ſhort, and conſiſts of twelve feathers, of which the four middlemoſt are of a dark duſky colour, and the four on each ſide *gradually* ſhorter, and of a pale aſh-colour edged with white. The under-ſide of the neck and breaſt duſky, with the feathers on the breaſt fringed with white. The chin, lower part of the breaſt,



breaſt, belly, thighs and vent white, except a few duſky ſpots on the ſides, thighs and vent.' The legs and feet are yellow, naked above the knees; and the toes entirely divided, without the leaſt connecting membrane between any of them. The claws are blackiſh.

No. 121.—The Purre. *Tringa Cinctus.*

Theſe birds are found in great flocks on our ſea-coaſt in the winter. I have had ſeveral of them in my poſſeſſion. There are three remarkable varieties of this ſpecies.

On the 1ſt of February 1776, a bird of the firſt variety, in its winter dreſs, from which I made this deſcription and a figure, was ſhot on the ſea-ſhore near Bexhill.

Its length from the tip of the bill to the end of the tail is ſeven inches; its breadth from tip to tip of the wings when extended, thirteen inches and an half. Its bill is an inch and a quarter long, black, and rather bent or curved downwards near the tip. The top of the head, hinder part of the neck, and the back, are of a duſky browniſh aſh-colour, ſpotted with darker brown: the upper covert feathers of the wings are brown, with the edges of a lighter colour: the quill feathers of the wings of a blackiſh brown, having their baſes and ſhafts white: the middle feathers of the tail of a duſky brown, and the reſt lighter or whitiſh. The under ſide of the neck, and upper part of the breaſt, are of a pale duſky brown, ſpotted with darker brown: the reſt of the breaſt, belly, and covert feathers under the tail, are of a pure white. The legs and feet are black, and have not any membrane or web between the joints of any of the toes.

I have ſince ſeen ſeveral of theſe birds in the winter, which all agreed exactly with the above deſcription, except a ſmall variation in reſpect to ſize.

The

The ſecond variety is in a mixed ſtate, between its winter and ſummer dreſs. On the 18th of September 1792 I ſhot one of theſe birds, amongſt ten or a dozen more, on the ſea-ſhore at Bexhill.

Its length from the tip of the bill to the end of the tail was ſeven inches; the breadth from tip to tip of the wings when extended, fourteen inches; and the bill, which was black and a little bent near the tip, one inch and a quarter long. The head and hinder part of the neck were variegated with reddiſh brown and black, the middle of the feathers being of a dark brown or black, with the edges of a pale reddiſh brown. The feathers on the ſhoulders were of an aſh-coloured brown, and thoſe on the back of a dark brown or black in the middle, having their edges of a pale yellowiſh or reddiſh brown, not very unlike thoſe of the Jack Snipe. The covert feathers of the wings were duſky, edged with pale brown, and thoſe next the quills tipped with white. The quills were of a duſky black with white ſhafts and baſes. The tail was rather pointed; the two middlemoſt feathers were of a dark brown edged with light yellowiſh brown, and the reſt were of a light aſh-colour with white ſhafts. The chin, belly and vent were white, but the breaſt was of a light brown, ſtreaked with darker brown; and the ſides of the belly were alſo marked with duſky ſpots. The legs were naked above the knees, of a black colour; and the toes were entirely divided, without any web between them.

Some time about the middle of the ſummer 1795 I had an opportunity of ſeeing a bird of the third variety in its ſummer dreſs, whoſe whole upper ſide and breaſt were variegated with duſky and yellowiſh brown, the middle of the feathers being of a blackiſh, and the edges of a yellowiſh brown. Its chin, lower part of the breaſt, belly, thighs and vent were white; and its bill, legs and feet black.

All

All theſe birds agreeing exactly in ſize, ſhape, length and colour of the bill and legs, particularly in having the toes entirely divided, without any web between any of the joints; and, laſtly, in the ſhafts of the quill feathers being white in all of them, induces me to look upon them as different varieties of the ſame ſpecies: if ſo, this bird not only changes its place of reſidence, but its dreſs alſo, according to the different ſeaſons of the year.

No. 122.—The Dunlin. *Tringa alpina.*

On the 31ſt of May 1780 I ſaw this bird on the ſea-ſhore at Bexhill: it ſuffered me to approach near enough to diſtinguiſh its colours, eſpecially the black mark on its breaſt, as figured in the folio edition of the Britiſh Zoology.

No. 123.—The ſmall grey Sandpiper. *Tringa arenaria.*

On the 31ſt of December 1793 a bird was brought to me which, I have no doubt, is the *Tringa arenaria* of Linnæus: its ſhape was ſhort and thick, very different from that of the Sanderling or Curwillet; and it had alſo a perfect back toe with a claw, which that bird is entirely deſtitute of. I was informed that it was killed on the ſea-coaſt near Rye, and that they were ſeen there in flocks in the winter.

No. 124.—The Golden Plover. *Charadrius pluvialis.*

This ſpecies is frequently killed on our ſea-coaſt in the winter; and, if my memory does not fail me, I have alſo ſhot it in the ſummer. But the moſt ſingular circumſtance relating to this bird is, that it varies in one of its characteriſtic marks. Two birds of this ſpecies, from which I drew a figure and deſcription, had no back toe, as appears both from my figure and deſcription: and indeed, to the beſt of my recollection, none that I ever ſaw had any back

toe, except one I ſhot on the 22d of September 1792, which, to my great ſurpriſe, had a ſmall back toe.

No. 125.—The Sea Lark. *Charadrius Hiaticula.*

Theſe birds are very common on our ſea-coaſt in the ſummer; but I have reaſon to think that they, or at leaſt the generality of them, leave us in the winter; for, during my reſidence at Haſtings, from the 19th of November 1792 to the 11th of February 1793, I never once ſaw this bird, although I was conſtantly on the look-out to take particular notice of this and other ſea-birds: but I remember one inſtance of this bird's being killed during a hard froſt in the winter by the ſea-ſide, near Pevenſey; and I have more than once obſerved it ſo early as February and March, particularly on the 19th of February 1787.

No. 126.—The Sanderling, or Curwillet. *Charadrius Calidris.*

Theſe birds frequent our ſea-coaſt in the winter, and are ſeen in large flocks. I received two of them in about a fortnight after I had drawn and deſcribed the ſmall grey Sandpiper: they were ſo different from that bird in ſhape, colour, and particularly in the total want of a back toe, that I have no doubt of their being a diſtinct ſpecies, and even that they belong to a different genus, as Linnæus has placed them.

No. 127.—The Sea-Pie, or Oyſter-catcher. *Hæmatopus oſtralegus.*

It is called here the Olive. I have frequently ſeen them in pairs on our ſea-coaſt in the ſummer, but do not recollect having ever ſeen them in the winter.

No. 133.—The Creſted or Tippet Grebe. *Podiceps criſtatus.*

This bird is ſometimes found here in hard winters. In the year 1789 I had a dead bird of this ſpecies in my poſſeſſion: its head appeared

appeared to be quite ſmooth, without any creſt, and I ſuppoſe it was either a female or a young bird; for, on the 27th of January in this preſent year 1795, a bird of this ſpecies was diſcovered ſitting under a hedge in the pariſh of Battle, at the diſtance of ſix or ſeven miles from the ſea: it was ſo much weakened by the ſeverity of the froſt, that it ſuffered itſelf to be taken, and was brought to me alive. I kept it alive till I had made drawings and a deſcription of it, during which time it erected the feathers on the top of the head into two tufts or creſts, and ſwelled out the white feathers beneath its cheeks into a kind of ruff, ſo as to make the head appear as if encircled by a ſort of hood. It was very pugnacious, ſtriking fiercely with its ſharp bill whenever I put my hand near it, and at the ſame time uttered a harſh ſcream. According to authors this bird ſpends its life almoſt wholly in the water:—is it not ſingular then that it ſhould be found on dry ground, not near any water, and at ſo great a diſtance from the ſea, eſpecially as its wings are ſo ſhort and unfit for long flight?

No. 134.—The Eared or Leſſer-creſted Grebe. *Podiceps auritus.*

This bird is very rare in our neighbourhood: I have had one in my poſſeſſion, which was killed in a freſh water pond on the 2d of May 1789.

No. 135.—The Avoſetta. *Recurviroſtra Avoſetta.*

This bird is not uncommon on our ſea-coaſt in ſummer; but whether it is to be found here in winter I cannot tell, as I do not recollect to have ever ſeen it at that ſeaſon. That it breeds here I have been an eye-witneſs, for I remember that, ſeveral years ago, I found in the marſhes near Rye, a young one of this ſpecies, which appeared to have been juſt hatched, and I took it up in my

hands, whilſt the old birds kept flying round me. I have alſo ſeen it in the ſummer on the ſea-coaſt at Bexhill.

No. 136.—The Puffin. *Alca arctica.*

It is found on this coaſt, and known about Eaſt Bourn by the name of the Parrot-billed Wille.

No. 137.—The Razor-bill. *Alca Torda.*

I think this bird is known here by the name of the common Wille; if ſo, it breeds in vaſt numbers in the cliffs at Beachy Head.

No. 138.—The black-billed Auk. *Alca Pica.*

I believe it is ſometimes found on our ſea-coaſt. In the hard winter of 1789 a bird of the Auk kind was brought to me, which I took to be this ſpecies.

No. 139.—The Guillemot. *Colymbus Troille.*

I have ſeen one ſtuffed and preſerved, which I underſtood was taken on this coaſt.

No. 140.—The ſpeckled Diver. *Colymbus ſtellatus.*

It is found on this coaſt: I have ſeen one or two ſpecimens of it.

No. 141.—The greater Tern. *Sterna Hirundo.*
No. 142.—The leſſer Tern. *Sterna minuta.*
No. 143.—The black Tern. *Sterna fiſſipes.*

The two firſt ſpecies are very common on our coaſt in the ſummer; but the black Tern is, I believe, very rare, for I never ſaw it but once.

No. 151.—Dun Diver. *Mergus Caſtor.*
No. 152.—Red-breaſted Gooſander. *Mergus ſerrator.*
No. 153.—Minute Merganſer. *Mergus minutus.*

I have ſeen all theſe birds; they were killed on our ſea-coaſt in the winter.

No. 160.—The Bean Gooſe. *Anas Segetum. Lath. Orn.* 11. *p.* 843. *n.* 28.

On the 8th of December 1796 three of theſe birds were ſeen near the ſea-ſhore at Bexhill, two of which were ſhot, and one of them, having only its wing broken, was alive when I received it. When I attempted to touch it, it pecked at my hand, and hiſſed exactly like the common tame Gooſe.

The largeſt of the two meaſured from the tip of the bill to the end of the tail two feet three inches; and from tip to tip of the wings when extended, four feet ſix inches. Its weight was three pounds and fifteen ounces; but the other, which was ſmaller, weighed only three pounds. Its bill was of a pale red, tinged with duſky on the tip and ſides: its head, neck, back, wings and tail were of a light aſh-coloured brown, mottled with darker brown, the center of each feather being darkeſt: the rump and tips of the wing-coverts and tail were white; and the leſſer wing-coverts, and baſtard wing, of a light aſh or ſlate colour, tipped with black; and the great quills duſky black: the whole under-ſide was of a dull white, clouded with light aſh-brown, paleſt towards the belly and vent, which were of a dull white. Its legs and feet were webbed, and of a dirty yellow, with black claws.

Notwithſtanding there was a conſiderable difference in the weight and dimenſions of theſe two birds, yet I ſuſpect that they were both young birds of the laſt ſummer, becauſe even the largeſt was inferior

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in weight and ſize to Mr. Latham's deſcription; their bill and legs were of a paler colour than he deſcribes them to be, and when dreſſed, their fleſh was tender and well-flavoured.

No. 167.—The Scaup Duck. *Anas Marila.*

Theſe birds frequent our ſea-coaſt in hard winters. On the 27th of January 1795 my ſervant, in company with another perſon, fired amongſt a flock of theſe birds conſiſting of near an hundred: he brought me a male and female; the latter proved to be the *Anas frœnata* of Dr. Sparman's Muſeum Carlſonianum.

No. 168.—The Shieldrake. *Anas Tadorna.*

This bird is found on our coaſt both in winter and ſummer: that it breeds here I am confident, having frequently ſeen a pair of old ones, and alſo a brood of young ones taken at Bexhill.

I beg leave to lay before the Society a Continuation of my Tables of the Appearance and Diſappearance of certain Birds.

A TABLE

To front Page 30.]

A TABLE of the Appearance and Diſappearance of the following BIRDS.

	1784	1785	1786	1787	1788	1789	1790	1791	1792	1793	1794
Swallow—*Hirundo ruſtica.*											
Firſt ſeen -	Ap. 13	Ap. 11	Ap. 27	Ap. 18	Ap. 15	Ap. 21	Ap. 18	Ap. 13	Ap. 9	Ap. 25	Ap. 19
Not ſeen after -	Oct. 14	Nov. 13	Nov. 14	Nov. 5	Nov. 14*	Nov. 16*	Oct. 21*	Nov. 1*	Oct. 24*	Oct. 19	Oct. 24*
Martin—*Hirundo urbica.*											
Firſt ſeen -	Ap. 26	May 3	May 3	May 16	May 9	May 8	May 4	May 4	Ap. 21	May 3	May 12
Not ſeen after -	Oct. 14*	Oct. 28*	Sep. 30*	Dec. 8*	———	Nov. 2*	Oct. 21*	Nov. 1*	Oct. 9*	Oct. 19	Oct. 24*
Sand Martin—*Hirundo riparia.*											
Firſt ſeen -	July 15	———	Ap. 27	Sep. 8	July 19	May 6	May 12	May 10	Ap. 16	———	———
Not ſeen after -	Sep. 4*	Sep. 2	Sep. 6	Nov. 5	Sep. 25	Sep. 29*	Aug. 21*	Sep. 23	Sep. 1*	———	———
Swift—*Hirundo Apus.*											
Firſt ſeen -	May 17	May 4	May 14	May 15	May 5	May 5	May 19	Ap. 28	May 3	May 6	May 13
Not ſeen after -	Oct. 14	Sep. 2	Sep. 6	Nov. 5	Sep. 10	Aug. 5*	Aug. 19	Aug. 12	Aug. 10*	Aug. 2	July 19*
Goat-ſucker—*Caprimulgus Europæus.*											
Firſt ſeen -	Aug. 23	Sep. 9	———	———	———	———	July 11	Aug. 30	May 16	Sept. 2	July 6
Not ſeen after -	———	———	———	———	———	———	———	Sep 4*	Sep. 14*	———	Sep. 28*
Turtle-dove—*Columba Turtur.*											
Firſt ſeen -	May 29	———	July 28	———	———	June 1	June 21	———	July 5	May 14	June 14
Not ſeen after -	———	———	———	———	———	Aug. 2*	———	———	———	Aug. 10	———
Wryneck—*Jynx Torquilla.*											
Firſt ſeen or heard	Ap. 16	———	June 30	Ap. 12	Ap. 17	May 5	Ap. 26	May 12	Ap. 3	Ap. 25	Ap. 14
Not ſeen after	———	Aug. 18*	Sep 22	July 6†	———	———	———	———	Sep. 7*	Oct. 18	Sep. 8*
Cuckoo—*Cuculus canorus.*											
Firſt ſeen or heard	Ap. 26	May 3	May 13	May. 7	Ap. 16	Ap. 27	May 10	May 9	Ap. 15	Ap. 27	Ap. 19
						June 19†			June 19†	June 27†	June 22†
Not ſeen after -	June 19†	Sep. 28*	Sep. 6	June 22†	June 17†	Sep. 9*	June 19†	———	Aug. 19*	July 27*	Sep. 19
Nightingale—*Motacilla Luſcinia.* *Sylvia Luſcinia.*											
Firſt ſeen or heard	Ap. 25	May 11	Ap. 25	Ap. 26	Ap. 16	Ap. 29	Ap. 26	Ap. 13	Ap. 11	Ap. 30	Ap. 21

Thoſe marked with an aſteriſk (*) were ſeen on that day, and not afterwards, till their return next ſeaſon.
Thoſe marked thus (†) were heard on that day, and not afterwards, till their return next ſeaſon.

II. *Anecdotes of the late Dr. Patrick Browne, Author of the Natural Hiſtory of Jamaica. By Aylmer Bourke Lambert, Eſq. V. P. L. S.*

Read Dec. 1, 1795.

HAVING in a viſit to Ireland in the year 1790 accidentally met with Dr. *Patrick Browne*, well known to this Society by his Natural Hiſtory of Jamaica, I judged it might not be an unacceptable anecdote to give ſome account of my interview with this veteran in thoſe purſuits which form the intentions of our meetings.

I firſt heard of him by the country people in the neighbourhood of Ballinrobe in the county of Mayo, at which place he lived. I ſent him a meſſage that I would wait on him. He was then ſo infirm that I found him confined to his room and his bed, but he received me with much cordiality when I told him my errand was to viſit him merely from reſpect as a lover of the Science of Botany; and I gave him the firſt information of our inſtitution, and the ſucceſs that had hitherto attended our reſearches.

He converſed much on the ſubject of botany, and informed me that he had correſponded for twenty years with Linnæus himſelf, and had communicated many plants to him. Thoſe Gentlemen who are at all converſant with the *Amœnitates Academicæ* will recollect, in the fifth volume of that collection, a paper under the title of *Pugillus Plantarum Jamaicenſium*, in which the deſcriptions of 130 ſpecies are more correctly given than they ſtand in Dr. *Browne*'s book. This was in conſequence of Dr. Solander's having purchaſed *Browne*'s whole collection, and ſent it to Sweden for Linnæus.

And hence, in the Species Plantarum of 1764, Linnæus was enabled to correct both Sloane and *Browne* himſelf in many inſtances.

After Dr. *Browne*'s return from Jamaica, and the publication of his Hiſtory, he took another voyage to the Weſt Indies, where he reſided, principally in Montſerrat and Antigua, occupied in the practice of phyſic, for four years. He returned home for the laſt time in 1781.

Having much leiſure during this ſtay in the iſlands, he collected a large Herbarium, and many ſeeds, which on his return he preſented to Dr. Edward Hill, Profeſſor of Botany in the Univerſity of Dublin.

He alſo began a *Flora Indiæ Occidentalis*, which formed a thin quarto volume; this he preſented to me, and it is now in the poſſeſſion of our Preſident. I recollect, in ſpeaking of this manuſcript, that he told me he had taken uncommon pains to deſcribe and diſcriminate the generic characters of the *Ipomæa* and *Convolvulus*; and that Linnæus had ſignified, in a letter to him, his approbation of the diſtinctions given of thoſe genera.

I could not help remarking the ſmall number of books that he ſeemed to poſſeſs on the ſubject of Natural Hiſtory, his ſupellex being confined to the *Genera* and *Species Plantarum* of Linnæus, and a copy of Hill's edition of *Ray*'s *Synopſis*, eſpecially when I recollected the conſiderable number of authors he had quoted in his Hiſtory of Jamaica; but he ſoon gave me to underſtand that in his laſt voyage he had the misfortune to loſe his library, conſiſting of 200 volumes on Natural Hiſtory ſubjects.

During my abode in his neighbourhood I paid him ſeveral viſits, in one of which he made me a preſent of a MS. *Flora Hibernica*, and of a ſmall Herbarium collected in the counties of Mayo and Galway, with a ſeparate Collection of Moſſes, which are now in the poſſeſſion of this Society.

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In my way to the Doctor I one morning found the *Cynosurus cæruleus* of Linnæus, which had escaped his notice, and of which he immediately gave a short description. This I have the pleasure of presenting to the Society, as a specimen of his hand-writing, and as the last description of a plant that he ever wrote.

When at Dublin, some time after I left him, I procured from Mr. Wilson the bookseller the letter I now produce, which was written a little time before his death. I produce it, not because it contains any very interesting information, but as a proof that to the last he preserved a wish to improve and propagate botanical knowledge. By this it appears too, that he had meditated to give all the assistance in his power towards the publication of the *Flora Hibernica.*

He received from me the first intelligence of the new edition of his History of Jamaica, and expressed a great desire to have seen it; but he died soon after, aged 70, and was buried at Crosboyne near Castle Macgarret in the county of Mayo.

Letter from Dr. Browne to Mr. Wilson Bookseller of Dublin, written a little while before his Death.

"MY design was only to give a simple and as cheap a Catalogue of the plants I met with here as I could devise. I mentioned it to Sir J. Banks, and he assured me he spoke to the Provost, and he promised to put a *Flora Hibernica* on foot. Such a Catalogue as mine might be of great service to such a work, and such a work alone deserves the embellishment and attention you mention. But it would require a visit to the south and north of the kingdom; undertakings by no means fit for infirmity at 70. However, by publishing small Catalogues, it might be brought about by individuals, and mine you are welcome to towards any thing of that sort.

Pultney's View of Linnæus I have not ſeen, and wiſh you would ſend it to me: I will get one of our carriers to call for it ſoon, and will be obliged to you to alter ſuch Engliſh names as you ſee proper. As to the Iriſh, if ever you print it, put the Iriſh in Italicks only. I wrote them as much to the pronunciation of the Iriſh as I could, but not according to the Iriſh orthography, which I could not find in any book. *Paddowpipe* is undoubtedly the proper name of the *Hippuris*. I do not think the addition of *ruſh* proper to any name, and the method of adding a ſhort character to the different *genera* (as in Linnæus's *Syſtema*) beſt, as in Martyn's of Cambridge. You mention the title-page: I think you ought not to publiſh more than a deſign of printing a *Flora Hibernica*, if ſuch a thing could be completed, and of giving a Catalogue, in the cheapeſt manner poſſible, of ſuch plants as have been collected for ſuch an undertaking, with the Engliſh and Iriſh names, keeping the deſcriptions and remarks for a capital work. As to Theirlheld and K. Eogh's, I have had them, and think nothing of them. I loſt all my books a few years ago: I had about 200 botanical books, and now I have only the *Genera* & *Species Plantarum* of Linnæus, with a copy of Ray's *Synopſis* in a Linnæan dreſs, which was the amuſement of ſome time to me ſome years paſt. Lord Lucan promiſed to ſend me another copy of Dill. and Ray's *Synopſis*. If you could ſucceed in getting any other additions, ſo as to undertake a general *Flora Hibernica*, if I live and am able to ſtir I ſhall give you what aſſiſtance I can in the manuſcript you have, which you may keep. *Liguſticum Scoticum* of that MS. is the *Smyrnium Oluſatrum*.

"I have made out a Catalogue of our Agarics, for which this laſt ſeaſon was very favourable, and it amounts to eighteen or more; but I have not this by me."

III. *Deſcriptions*

III. *Deſcriptions of three rare Species of Britiſh Birds.* By G. Montagu, *Eſq. F. L. S.*

Read March 1, 1796.

1. SYLVIA SYLVICOLA.—WOOD WREN.

S. vireſcens ſubtus flaveſcens, ſupercilliis luteis, abdomine criſſoque niveis.

Aſilus major, *Briſſ. orn.* 3. *p.* 482. A.

Regulus non criſtatus major, *Will. orn. p.* 228.—*White, Hiſt. Selb. p.* 55.

Laubvögelchen, *Naturf.* 27. *p.* 47. 4.

Wood Wren, *Linn. Tranſ.* 2. *p.* 245. *pl.* 24.

IN the latter end of April in the year 1790, as I was walking with my gun, I was attracted by the note of a bird I had never before noticed, and preſently diſcovered it on an oak-tree, at the verge of a wood in the pariſh of Eaſton Grey in the county of Wilts. The firſt appearance of the bird much reſembled that of the Yellow Wren, *Motacilla Trochilus*; but its note and manners at once decided it to be a very different ſpecies. It is an active reſtleſs bird, and, at the time I ſhot it, was exceſſively buſy in purſuing ſome ſpecies of winged inſect, which ſeems to be its principal food. Upon near inſpection it might readily have been miſtaken for the

Trochilus, had I not been attentive to its note and actions. Having recollected that Mr. White, in his Nat. Hiſt. of Selborne, page 55, ſpeaks of three diſtinct ſpecies of Yellow Wrens, I concluded this to be one, as doubtleſs the *Motacilla Trochilus* and *Motacilla Hippolais* are the other two. In order therefore to compare thoſe with this ſpecies, I ſhot freſh ſpecimens, with which that country abounds, and by which I was thoroughly convinced they were diſtinct; and in all probability this is the identical bird Mr. White calls the Largeſt Yellow Wren, and deſcribes as inhabiting the high woods of beech at Selborne.

As this elegant little ſpecies of warbler ſeems to have eſcaped the notice, or at leaſt the hiſtoric attention, of ornithologiſts, probably from confounding it with the Yellow Wren, it was my intention to preſent it to the Linnean Society as ſoon as opportunity offered the diſcovery of its neſt and eggs, in order that it might be added to the liſt of Britiſh birds. In a tour through South Wales the following ſpring, I found this ſpecies not unfrequent in the oak woods of Carmarthenſhire. The firſt I ſaw that ſeaſon was on the 29th of April, the thermometer at 51 at 9 o'clock A. M. and, in a week after, a great many more arrived, which, from their inceſſant chirping and actions, I took to be all males. About the middle of May I plainly diſcovered ſome females were arrived, and on the 30th of that month I had the good fortune to find two neſts, by watching the birds with ſome of the materials in their bills, and ſoon after took them with ſix eggs each; and in order to clear the matter beyond doubt, I caught one of the females on the neſt, and ſhot the male, who approached very near, at the ſame time. It may not be improper to remark, that I found theſe birds in greateſt plenty in coppice woods of oak of about eighteen or twenty years growth: their flight is ſhort, ſlow and vibrating, as they move from ſpray to ſpray, ſeldom varying their ſituation above twenty yards.

yards from the firſt choſen ſpot till the young take wing, when they quit the lower branches, and take to the higheſt trees, ſearching for inſects amongſt the upper foliage. At this time they are not ſo vociferous, and have entirely left off that conſtant vibration of their wings, which ſeems peculiar to the courting and incubating ſeaſon.

It is not to be ſuppoſed that this ſpecies is a new or accidental viſitant to theſe parts, but that its near reſemblance in ſize and colour to the Yellow Wren has probably occaſioned it to be miſtaken for that bird. But whoever will bring them together will at once obſerve, that the plumage of this is much more vivid; the ſtroke above the eye of a much brighter yellow; and, as a ſpecial characteriſtic mark, the belly and under tail-coverts are invariably of a pure white, which in the Yellow Wren are tinged, and the latter part daſhed with yellow. There is no diſtinction in the plumage of the ſexes of either ſpecies: this ſhould not therefore be miſtaken for the male of the other, which doubtleſs has often been the caſe; neither ſhould it be confounded with the *Hippolais*, that bird being much inferior in ſize, and none of the under parts of a pure white: its legs are alſo duſky, in which it differs from both the *Sylvicola* and the *Trochilus*. Beſides, were every other mark of diſtinction wanting, the note, manners and habits of this widely differ: this only inhabits woods in the breeding ſeaſon: its cry, for it cannot be called a ſong, bears not the leaſt reſemblance to any other ſpecies: the firſt part ſeems to expreſs the word *twee* drawn out to ſome length, and repeated five or ſix times ſucceſſively, terminating in notes ſomething of the ſame tone, but delivered in a hurried manner, ſhaking its wings at the ſame time. This ſpecies weighs about two drams forty grains; the length five inches and a quarter: the bill is duſky; irides hazel: the upper part of the head, back, ſcapulars, and upper coverts of the tail, are of a lively yellow green:

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over the eye is a bright brimſtone-coloured ſtroke; the cheeks and throat yellow; the upper part of the breaſt, white tinged with yellow; the lower part, belly, and under tail-coverts, pure white: the quill feathers are duſky, edged on their exterior webs with yellow green; the tail very little forked, coloured like the wing feathers, except the two outmoſt, which want the yellow margin: the legs are of a yellowiſh brown.

The female caught on the neſt weighed three drams.

This bird is a migratory ſpecies, and like moſt, if not all our ſummer migrants, the males precede the other ſex in their vernal flight a week or ten days. It leaves us about the middle of September.

The neſt is formed on the ground, beneath the ſhade of trees or buſhes, conſtructed of dry graſs, with a few dead leaves and a very little moſs externally, and lined with finer graſs and a few long hairs. Its ſhape is oval, with the entrance near the top, like thoſe of the Yellow Wren and Leſſer Pettichaps; but materially differs from them in the internal part of its ſtructure, as thoſe birds invariably line their neſts with feathers. The eggs weigh from eighteen to twenty-two grains; their colour white, ſprinkled all over with ruſt-colour ſpots: in ſome thoſe markings are confluent.

Theſe obſervations were intended to be preſented to the Linnean Society immediately after the diſcovery of the neſt and eggs; but, by ſome unaccountable means, my notes were miſlaid: this delay gives me the opportunity of ſeeing the ſame bird deſcribed by Mr. Lamb in the ſecond volume of the Linnean Tranſactions, p. 246; but as neither the female, neſt, eggs, or place of nidification is mentioned, I have thought proper to retain the original form of my notes, eſpecially as Mr. Lamb makes mention of my name as having noticed the bird firſt to him under the denomination of Wood Wren, which name he has retained. I cannot, however,

take upon myſelf the merit of its firſt diſcovery as a Britiſh ſpecies: that properly belongs to Mr. White. I have, however, fortunately been enabled to inveſtigate its hiſtory more minutely; the only inducement at this period to lay it before the Society. This bird is alſo found in Germany, where it is likewiſe a migratory ſpecies, as we are informed by Dr. Beckſtein in the 27th volume of Naturforſcher, p. 38, where he gives a deſcription of ſuch of the *Motacilla* ſpecies inhabiting that country as have a yellow ſtreak over the eye.

To my friend Mr. Latham I am indebted for the tranſlation of that part of the work for my inſpection, where I find under the denomination *Der Laubvögelchen* *, p. 47, No. 4, an excellent deſcription of this bird and its manners; though the author does not ſeem acquainted with the neſt and eggs. He adds *(Motacilla Sibilatrix)* ſuperciliis luteis, ſupra vireſcens, ſubtus flaveſcens. This author particularly remarks the whiteneſs of the under tail-coverts, the ſtrong characteriſtic mark of diſtinction.

After what has been ſaid of this hitherto little known beautiful ſpecies of warbler, little can be added to elucidate its hiſtory: to my former remarks I can only ſay, that ſince my intimate acquaintance with the bird, I have met with it in plenty in all the ſouthern counties and wooded parts I have been in, eſpecially where oak or beech abound. To this I have taken the liberty of adding a coloured drawing of the egg, taken from thoſe in my own collection †. See *Tab.* 2. *fig.* 1.

* Little leaf-bird.

† I met with this bird in Parkinſon's Muſeum under the title of Green Wren, caſe No. 271.

2. TRINGA

2. TRINGA NIGRICANS.—PHAYRELARN SANDPIPER.

Tr. cinereo-nigricans, gula abdomineque medio albis, roſtro baſi pedibuſque rubris.

THIS non-deſcript ſpecies of *Tringa* was killed at Larn, or Lougharne, on the coaſt of Carmarthenſhire in Wales, January 20, 1792, and preſented to me by my friend Robert Phayre, Eſq. which induced me to give it the above trivial name. It was ſhot in company with its congenera the Purre *(Tringa Cinctus)*, &c. All I could learn was, that, at the time it was killed, the weather was very ſevere, and that two others had been ſhot there the ſame ſeaſon, and were called by the fiſhermen *Red-legs*.

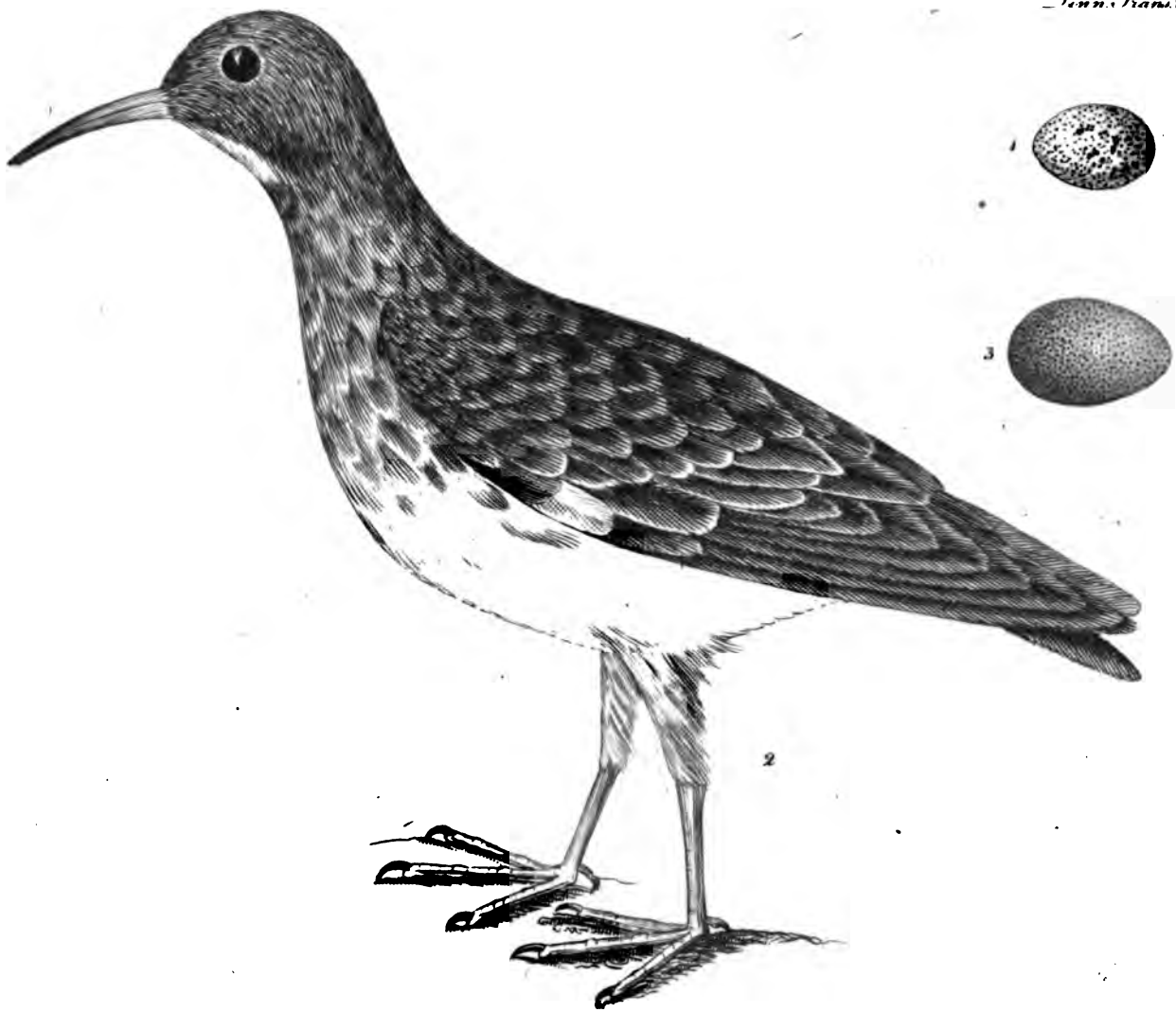
In ſize it rather exceeds the Purre: the length was eight inches and a half; the bill ſlender, an inch and a quarter long, tapering towards the point, a little curved, and of a dull red colour, except at the apex and ſides; the irides hazel; the head and neck duſky black; eye-lids whitiſh; the throat white; back and ſcapulars black, edged with aſh-colour; the wing-coverts black tipt with white; quill feathers black, ſlightly edged with white on the exterior webs; ſhafts white; breaſt and all beneath white, prettily ſpotted with black, except the middle of the belly and vent; the rump black; the two middle feathers of the tail black, the outer one cinereous, and the reſt duſky; the legs and toes dull red; claws black and blunt; toes nearly divided to their origin; middle toe an inch long.

This bird is now in my collection, from which I have taken the figure annexed, *Tab.* 2. *fig.* 2. *

* Mr. Latham ſuſpects this may poſſibly be the Purple Sandpiper figured by Mr. Walcot in his ſecond volume of Britiſh Birds.

3. ALAUDA

Penn. Trans. IV. tab. 2. p. 10.



3. ALAUDA PETROSA.—ROCK LARK.

A. olivaceo-fuſca ſubtus flavicans, lateribus colli pectoreque fuſco maculatis, rectrice extima albo dimidiata.

Alauda obſcura, *La. Ind. orn.* 2. *p.* 494. 7.

Duſky Lark, *Lewin's Br. birds, vol.* 3. *pl.* 94.

HAVING been favoured with a ſpecies of *Alauda* a few years ſince, from that excellent ornithologiſt Mr. Latham, amongſt others of the ſame genus, in which he honoured me by a requeſt of my opinion as to their diſtinction, I did not heſitate in acknowledging my being wholly unacquainted with this bird; but I took the liberty of pointing out ſuch ſpecific differences from all other Britiſh larks, as might obviate the idea of its being only a variety of ſome other ſpecies. It was the only one that gentleman had ever ſeen, and was ſent to him by Mr. Lewin. As no deſcription of it could be found in any author, I gave it the name of the Duſky Lark, for diſtinction; which name Mr. Lewin afterwards adopted in his publication on Britiſh birds, vol. iii. No. 94, as well as Mr. Latham in his *Ind. orn.* vol. ii. p. 494—7. In the year 1791 I diſcovered this bird to be a native of the coaſt of South Wales, from Monmouthſhire to St. David's, the extreme part of Carnarvonſhire, in all the rocky ſituations. Upon enquiry of the natives, I found ſome of the fiſhermen knew it by the name of the Rock Lark, and that it was indigenous to thoſe parts: this name therefore I continue it by, inſtead of Duſky Lark, being expreſſive of its habits. As I had an opportunity of ſeeing theſe birds daily, I thought myſelf fortunate not only in proving, beyond all doubt, that it was a Britiſh ſpecies, but alſo in being able to inveſtigate its natural hiſtory, and with certainty to add another bird to the catalogue of this country; and my wiſhes were fully accompliſhed by finding ſeveral neſts with eggs. There is ſome reaſon to believe Mr. Pennant had met with

this bird many years before it was given to the world as a diſtinct ſpecies by Mr. Lewin; for, in his folio edition of Britiſh Zoology, pl. P i, he has given what he calls a variety of the Tit-lark (*Alauda pratenſis*) with duſky legs, ſhot on the rocks on the coaſt of Carnarvonſhire. Should this prove to be the ſame bird, of which I believe there is no doubt, it does not detract from the merit of Mr. Lewin, who firſt gave it as a diſtinct ſpecies, but only ſerves to ſhew the ſlow progreſs of light upon Natural Hiſtory. That gentleman, however, did not ſeem acquainted with the particulars of its hiſtory. This circumſtance has induced me to lay before the Society the fruits of my further diſcovery reſpecting it.

The Rock Lark only affects the rocky parts of the coaſt: where the ſandy flats intervene it is not to be met with, except in winter, when it is occaſionally found in the marſhes, but ſeldom, if ever, out of the influx of the ſpring tides; from which we may conclude its food is principally marine inſects. Early in the ſpring it begins its ſong, which much reſembles that of the *Alauda pratenſis*, mounting in the air like that bird, and returning again to the ground, or ſome neighbouring rock, with motionleſs wing. It begins breeding early in the ſpring: on the 16th of April I found a neſt with five eggs: it was placed upon the ſhelf of a rock, about fourteen feet from the ground, behind a tuft of coarſe graſs, beneath a ſmall buſh. The neſt is formed of dry graſs, marine plants, and very little moſs externally, and lined with finer graſs, and a few long hairs. The eggs are of a dirty white, ſprinkled with numerous ſpecks of brown, darker and confluent at the larger end, ſo as to appear on that part wholly brown: their weight is about 36 grains.

The bird weighs about ſeven drams; the length ſix inches three quarters. The bill is duſky, near ſeven eighths of an inch long from the apex to the corner of the mouth; irides hazel; the upper part of the head, back of the neck, and tail-coverts, are of a dark brown;

brown; the back and ſcapulars of the ſame colour, obſcurely marked with duſky ſtrokes; above the eye, and beneath the ear, is a lightiſh-coloured ſtroke; the throat whitiſh; the breaſt and belly yellowiſh white, the former blotched with large duſky ſpots; the ſides marked with ſtrokes of the ſame; under tail-coverts light brown; the two middle feathers of the tail dark brown, the others duſky,—the outer one of a dirty yellowiſh white on the interior web and the point of the exterior,—in the ſecond feather the light colour is juſt viſible at the end; the quill feathers and wing-coverts are duſky, ſlightly edged with light brown; legs and toes duſky; claws black; hind claw four tenths of an inch long, and ſomewhat crooked. The female reſembles the male.

The young birds are not maturely feathered till after the winter of their firſt year; till then their upper parts have a tinge of olivaceous aſh-colour; beneath, the lighter parts are yellowiſh, and the coverts of the wings more deeply margined with light brown: the baſe of the under mandible and legs leſs duſky.

I have lately obſerved this bird on the coaſt of Kent and Suſſex.

Mr. Lewin having publiſhed a figure of this bird already, its egg only is here delineated, *Tab.* 2. *fig.* 3.

IV. *Account of ſome Species of Foſſil Anomiæ found in Derbyſhire. By Mr. William Martin, F. L. S.*

Read April 5, 1796.

AMONG the petrifactions of Derbyſhire, which I have been drawing and deſcribing for ſome time paſt, there appear to me none more worthy of a careful examination than thoſe foſſil ſhells, generally referred by authors to the family of *Anomia:* the variety of form the different ſpecies exhibit, and the prodigious quantity of ſome of thoſe ſpecies our limeſtone *ſtrata* afford, muſt ſtrike even a caſual obſerver as curious circumſtances, and certainly well deſerve the attention of the Naturaliſt. Though my own reſearches, in regard to this genus of foſſil *exuviæ*, have been indirect and imperfect, it has chanced that a great variety of ſpecimens, within this year or two, has paſſed through my hands: among theſe I reckon near thirty diſtinct ſpecies, ſeveral of which ſeem to have eſcaped the notice of authors. The *Anomia* delineated in the annexed tables, is one I ſuppoſe to be as yet undeſcribed. It appears to have been a curious ſhell; its form is very ſingular; and the *perforation*, which is placed in what is commonly called the *upper valve*, differs from that of every other foſſil ſpecies I have yet ſeen, in reſpect to its ſuperior ſize, as well as its ſituation.

DESCRIP-

DESCRIPTION.

ANOMIA (cuſpidata), teſta conica ſulcata: valvula altera convexa, nate incurvata: altera pyramidata, magno foramine trigonali. *Tab.* 3.

Sharp-pointed conical Anomia.

The *general figure* of this ſhell is conical.

The *beaked* or *under valve*, as it is uſually called, is convex, broad (its greateſt extent being from ſide to ſide), and wrought with longitudinal ribs, which are cloſely ſet, thick, prominent, and croſſed by a few ſlight concentric wrinkles, marking, apparently, the growth of the ſhell. The middle rib is much larger than the reſt, forming a high convex ridge down the centre of the valve, increaſing in breadth from the beak to the margins, which in that part are undulated or waved. The number of ribs, including the middle one, about twenty-nine. The *beak* is ſmall pointed, and curved over the hinge.

The *hinge* lies on a perfect ſtraight line, extending the whole breadth of the ſhell.

The *upper valve* is pyramidal, gradually tapering from a broad baſe, formed by the other valve, to a fine point or *apex*, which is the centre or middle part of the valve produced and acuminated. The *back*, or that portion of the *pyramid* proceeding from the margins, is rounded, longitudinally ribbed, and indented with a deep concave groove or *ſulcus*, correſpondent to the ridge in the under valve. The groove and ribs are croſſed by a few ſtrong but diſtant wrinkles. The *front*, or that part which extends from the hinge to the *apex*, is flat, ſmooth, and perforated; in figure it nearly approaches to an equilateral triangle. The *perforation* is very large; it runs through the middle of this ſide of the valve, and reſembles

a long perpendicular ſlit or ſeut. Its greateſt breadth is at the hinge, from which it gradually diminiſhes to a point.

This ſpecies is very rare: I have only met with one perfect ſpecimen, which was found at Caſtleton, in the common, hard, grey limeſtone. It is a complete change, evidently retaining the external ſhape and markings of the original, which has been diſplaced by limeſtone, ſimilar to that in which the foſſil was lodged. The ſame kind of ſtone, alſo, and ſpar blended together, conſtitute the interior part of the ſpecimen, and fill up the aperture in the front of the conical valve.

EXPLANATION OF THE FIGURES.

TAB. III

Contains different views of the Anomia deſcribed above: the figures the exact ſize of the ſpecimen from which they were taken.

Fig. 1. A full view of the *under* or *beaked* valve.

Fig. 2. Repreſents the ſpecimen placed in a proper poſition for ſhewing the *hinge*, with the *beak* of the *under* valve *, and the flat perforated ſide of the *upper* or *conical* valve.

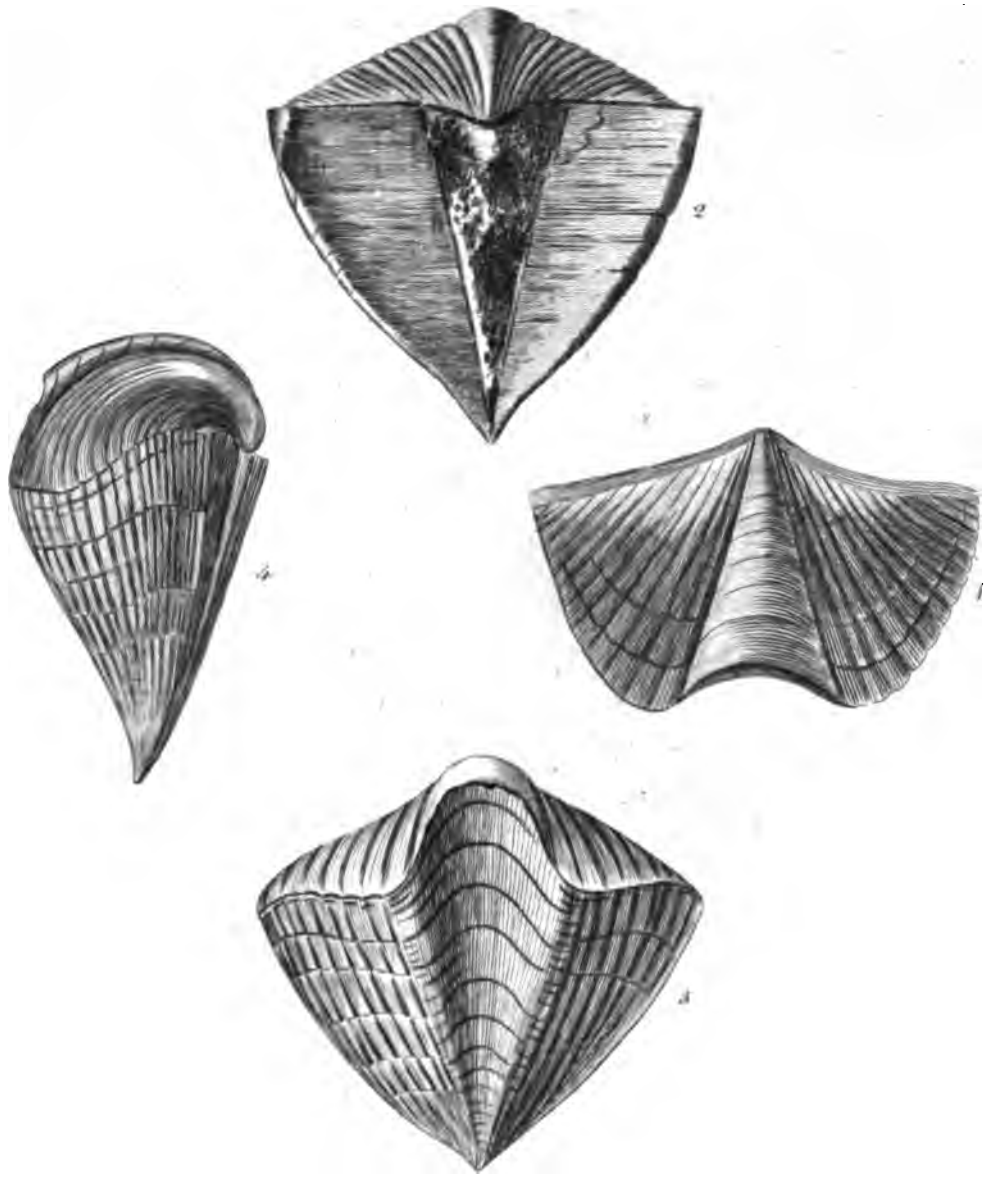
Fig. 3. An oppoſite view, ſhewing the back of the conical valve, with its deep groove or furrow, and the undulation of the margins.

Fig. 4. A ſide view of the ſame ſpecimen.

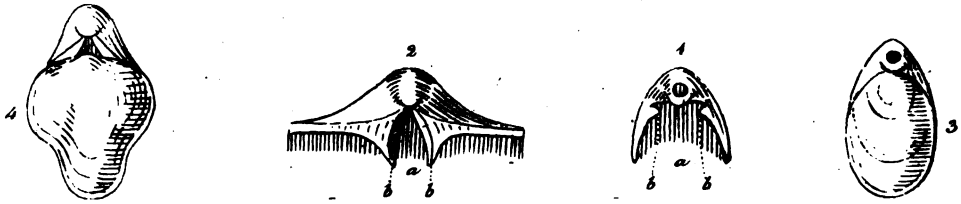
Obſervation. It ſeems probable that this ſhell, in a recent ſtate, adhered by the flat perforated part of the larger valve to ſome other body. I believe the few living Anomiæ which are known, are al-

* It is proper to remark, that what is called the under valve forms the upper part of fig. 2, 3, 4. the poſition in which they are given appearing moſt agreeable to the general make of the ſhell.

ways



Linn Trans. IV. tab. 4 p. 47.



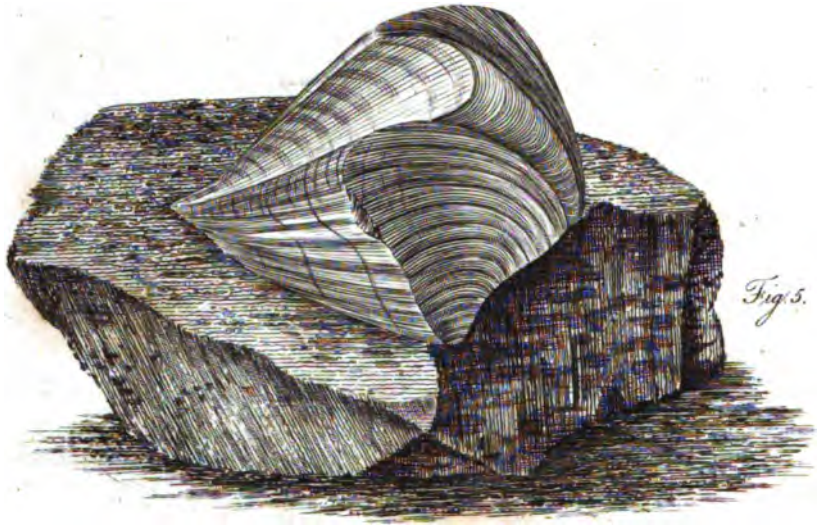


Fig. 5.

ways found fixed to ſtones, corals, &c. by a ſtrong tendinous ligature, that paſſes through their perforated beaks. In this ſpecies it is evident, from the apparent ſize of the aperture, that a large portion of the included animal was left bare, which, inſtead of a ligament, might have been furniſhed with a ſtrong adheſive power, ſimilar to that enabling limpets, and ſome other univalves, to ſtick to rocks, &c. In Tab. 4. I have given a ſketch of the ſhell thus fixed: it will help to elucidate the idea I have formed relative to its recent ſtate; and, as the poſition of the figure differs, may aſſiſt the explanation of the other figures.

Tab. IV.

The large figure in this table (5*) has been already noticed: the ſmall figures are explanatory of a few remarks I beg leave to offer on the *hinge* and *perforation* of the *Foſſil Anomiæ*, together with a ſketch of an arrangement which will include all the different ſpecies yet collected in Derbyſhire.

Of the Hinge.

It has been ſuppoſed that the *Anomiæ* whoſe hinge is on a ſtraight line, like that of ſome of the *Arcæ*, were in a ſimilar manner multarticulate, or furniſhed with many teeth: but perhaps this is not the caſe:—in all of them I am ſure it is not. The moſt perfect extraneous foſſil I ever ſaw, was a *ſingle* valve of a ſquare-hinged Anomia: it retained its ſhelly nature, with little or no change, and the hinge was quite entire and diſtinct. In this, however, as well as in many leſs perfect petrifactions of ſingle valves of the ſame kind I have occaſionally met with, I could never diſcover the leaſt appearance of a multarticulate connexion. Indeed from what I have been able to obſerve it ſhould ſeem, that the *cardo* in the ſtraight-hinged foſſil *Anomia* is the ſame, in many reſpects, as that of the recent ſpecies, namely,

namely, a cavity or notch under the beak of the larger valve furniſhed with two ſmall lateral prominencies; and in the ſmaller valve a projection that correſponds with the notch and hollows that receive the prominencies juſt mentioned. But of this a better judgment may be formed by comparing Tab. 4. fig. 1, the top of the under valve of an *Anomia*, known in the recent ſtate, and alſo found in great quantities foſſil, with fig. 2, a correct drawing of the ſame part of a petrified ſingle valve of the ſtraight-hinged kind. In this laſt the cavity *a* (forming when the valves are united a triangular aperture between the beak and hinge), and the pointed proceſſes *b*, *b*, may perhaps anſwer the purpoſe of the notch *a*, and lateral prominencies *b*, *b*, fig. 1, though greatly differing in ſhape. That this is at leaſt probable will appear, if we examine fig. 5, which repreſents the petrifaction, fig. 2, as commonly found, of ſolid limeſtone, with the valves joined. Here it is evident a part of the cavity, with the proceſſes * *b*, *b*, of fig. 2, are covered by the upper valve, the hinge of which, as in the recent *Anomiæ*, I ſuppoſe to be indented into the bottom of the notch, and furniſhed on the inſide with hollows anſwerable to the prominencies in the other valve. Before however the whole internal ſtructure of the foſſil ſtraight-hinged *Anomiæ* can be properly determined, it will be neceſſary to examine a perfect, detached *upper* valve, which I have never yet been fortunate enough to meet with.

Of the Perforation.

Some authors, in their definition of an *Anomia*, have conſtituted the perforation as the leading or eſſential character of the *genus*, and have even confined it to a particular part of the ſhell—the

* In a ſpecimen of a ſingle valve which I have lately met with, theſe proceſſes are not ſtraight, as in fig. 2. their points being curved inward, towards the hollow of the valve, ſo as to reſemble hooks.

beak

beak of the larger valve. It is not however conſtantly placed in that ſituation, as one of the recent ſubjects, the *Anomia Ephippium*, *Lin. Syſt. p.* 1150, and the foſſil deſcribed in the preceding pages, evince. Nor does it appear that it ſhould be conſidered as a principal or determinate characteriſtic of this family; for in examining ſome hundred ſpecimens, ſimilar to thoſe repreſented by fig. 7, 8, 10, as well as all the different ſpecies which come under the diviſions thoſe figures elucidate, I have not been able to detect the ſmalleſt aperture in either of the valves, though many of the ſpecimens were far more perfect than ſome of thoſe in which the perforation is always ſufficiently viſible. I am well aware that ſome of theſe imperforate *Anomiæ* would be ranked by Conchologiſts, who eſteem the aperture as the leading character, under another *genus*; for inſtance, the *Anomia Gryphus*, and other ſpecies of a like form, with the *Oſtreæ*. But though there may be ſome doubt reſpecting the family to which the foſſils in queſtion properly belong, certainly there is no *genus* yet eſtabliſhed, except *Anomia*, that will receive thoſe imperforate bivalves repreſented by fig. 7, 8, 10. Muſt we therefore form a new *genus* for the ſubjects under conſideration, or adhere to the definition of an *Anomia* Linnæus has left us, in which the perforation is not, I think, conſidered as a conſtant generic character? Perhaps till more accurate inveſtigations prove the hinge (from which without doubt the leading character in every family of bivalves ſhould be taken) in the perforated *Anomiæ*, to differ from that of the imperforate, it will be adviſable for thoſe who are engaged in the purſuit of extraneous foſſils to conſider *all bivalves with unequal valves, the beak of one being produced or more prominent than that of the other (generally the ſmaller valve), and for the moſt part curved over the hinge*, as belonging to the *genus* of *Anomia*.

An Attempt towards an Arrangement of ſuch Anomiæ *as have been collected in Derbyſhire.*

	Number of Species collected in each Diviſion.
1. Imperforate;	
Or thoſe which have no viſible hole or perforation in either valve.	
——— with one valve gibbous, the other flat or concave.	
—— —— hinge rounded, or not on a ſtraight line. Fig. 9	1
—— —— hinge on a ſtraight line. Fig. 10 -	7
——— with both valves convex.	
—— —— hinge rounded, or not on a ſtraight line.	
margins even. Fig. 8 - -	3
margins waved. Fig. 7 - -	3
Perforate;	
Or thoſe in which one of the valves is pierced with a hole.	
——— with both valves convex.	
—— —— hinge not on a ſtraight line.	
the beak of the larger or under valve pierced through like a tube. Fig. 3. 1	4
a triangular aperture between the beak of the larger valve and hinge. Fig. 4	6
—— —— hinge on a ſtraight line.	
with a triangular aperture under the beak of the larger valve. Fig. 2. 5	4
with the upper valve perforated. Fig. 6	1

I have at preſent no more to offer on theſe ſubjects. At ſome future period I ſhall be happy in having permiſſion to lay before the Society ſketches of the other *Anomiæ* remaining in my hands, which are judged to be non-deſcript.

V. *Eſſay*

V. *Eſſay on the Eye-like Spot in the Wings of the Locuſtæ of Fabricius, as indicating the Male Sex. By Profeſſor Anthony Auguſtus Henry Lichtenſtein, F. M. L. S.*

Read May 3, 1796.

INTER inſecta, præ ceteris curatiore digna ſunt conſideratione *Locuſtæ* ſenſu latiore; ſive illæ ſpecies *hemipterorum*, quas immortalis Linnæus communi nomine generico, *gryllos* appellat. Fabricius vero, quem, pro ſolidiſſimo entomologiæ ſyſtematicæ conditore, venerari fas eſt, tamquam ad diverſa genera: *acridium*, *truxalis*, *acheta*, *locuſta* et *gryllus*, pertinentes, a ſe invicem ſegregavit, et ſubtiliore methodo deſcripſit. Plurimum enim noſtra omnium intereſt, ut præſertim diſcamus naturam atque indolem eorum animalium, quotquot humano generi proxime, vel ad uſum fructuoſa ſunt, vel rurſus pernicioſa et ad noxam damnifica reperiuntur. Jam vero haud facile alius ordo naturalis inſectorum, arctiori nexu cum œconomia copulatus cohæret, dum vitæ humanæ commodis in omni terrarum orbe obeſt, paſſim vero etiam, utpote quem inter cibos recipere, multæ gentes dignantur, idem ſimul prodeſt, quam *Ulonata* Fabricii, et quidem præcipue, quotquot eorum pedibus ſaltatoriis inſtructa ſunt. Non ſine adflatu divino præclarus ille Iſraëlitarum legiſlator, Moſes, quum ſuo populo præcepta circa cibos traderet, atque omnium reliquorum inſectorum volatilium uſu, cives Hebræos interdiceret, blanda duntaxat alimenta a *gryllis* deſumenda illis conceſſit, ac ſolis *ulonatis ſaltatoriis* veſcendi veniam dedit. "Omne inſectum alatum," inquit *Levit.* xi. 20. ſeqq. "quaternis pedibus in-

" grediens, abominandum vobis esto. Solummodo ista comeditote
" ex insectis alatis, quæ quaternis pedibus ingrediuntur, quotquot
" habent duo crura præter suos pedes, quibus saltent super terram.
" Sequentia ex illis comeditote: *gryllum* ejusque species, *locustam* se-
" cundum ejus species, *truxalidem* secundum ejus species, et *acbetam*
" secundum ejus species."

Neutiquam est, cur miremur, antiquissimum illum auctorem jam in quatuor genera dispescere istius modi insecta, et singulorum horumce generum plures agnoscere species. Quem ad modum enim ignoti nulla cupido; ita rursus noscitare, domique perspicere amant homines naturam illarum rerum, quas pro victu cupediisque usurpare consueverunt. Hinc factum est, ut historia naturalis ulonatorum adsultim ingredientium in oriente percrebresceret multis seculis ante, quam Europæi spreta isthæc sibi fastidiataque monstra, propius considerare et notis peculiaribus a se invicem distinguere sustinerent vel dignarentur. Tametsi vero nunquam in omni Europa, quantum equidem sciam, usquam ille Asiatis Afrisque solemnis mos, locustis vescendi obtinuerit, aut olim facile unquam in consuetudinem abiturus esse videatur: nihilo secius tamen illud insectorum genus, vel eo nomine solertem attentionem meretur, quod identidem agros pessimis exemplis devastans, magnam calamitatem infert rei rusticæ. Quam ob rem tot tantique exstant singulares de locustis libri, totiesque obiter, et quasi aliud agendo, de iisdem exposuere docti homines, modo agricolis, nunc naturæ curiosis consulturi, ut noctuam Athenas inferre putetur, si quis novi aliquid et inauditi de hoc insectorum genere docere præsumat. Verum tamen manet inexhausta dives illa naturæ vena; et immane quantum adhuc restat indagandum, circa bestiolas, falso pro jam satis superque cognitis habitas. Sed qui recens patefactis naturæ mysteriis, locupletare cupit litterarum studia, næ ille vehementer errat, ubi ultro sibi manifestatum iri sperat ea, quæ celavit ad hunc usque diem solers opifex,

ſex, nuſquam niſi in minimis tota natura, curioſos, ſed parum oculatos cordatoſve obſervatores, perfunctorie ſupinaque oſcitantia tractantes intricata ſtructuræ animalis miracula. Dici, quin animo fingi vix poteſt, quantum per omnem ſubſidiorum litterariorum apparatum, adhuc lateat in adumbrationibus generum et formarum, quæ ad ulonata pertinent, rite conſtituendis. Contigit mihi, *gryllos* et *locuſtas* in ditiſſimo muſeo Holthuſiano improbo labore examinanti, errores quoſdam inveſtigare, qui viros in entomologia verſatiſſimos induxerunt, ut notas et characteres genericos cum ſpecificis confunderent, et meras diverſitates e ſexus diſcrimine ortas, pro ſpecificis proprietatibus adhiberent. Sic tribuit Linnæus numquam niſi honorifice nominandus, *Grillo ſuccincto* gulam cornutam, quaſi characterem ſpecifici, id quod recentiores entomologi, ejus auctoritatem temere ſecuti, uno ore confirmant. At cuncti *grylli* Fabricii habent cornu, longius vel brevius in gula; eoque tamquam charactere naturali generico liquidiſſime a *locuſtis*, *achetis*, *truxalidibus* et *acridiis* diſtinguuntur. Ex hoc abuſu characteris generici, pro nota ſpecifica, non poteſt fieri, quin oriantur errores, excuſandi quidem, ſed nihilo minus emendandi. Plurimum reverendus Herbſt (*Archiv. inſ. tab.* 54. *fig.* 2.) exhibet iconem *Grylli Lineolæ* Fabric. n. 29. ſub nomine *Grylli ſuccincti*, propter gulam cornutam. Quis hoc illi vitio vertere poteſt, quum nemo uſquam annotaverit, omnes omnino ſpecies *grylli* Fabriciani communiter gaudere hacce tali protuberantia corniculata, nunc recta, nunc incurvata, modo longiore, modo breviore, nunc ſerrata, nunc integerrima? Nondum conjectura adſequi valui, cui bono natura tribuerit hanc partem peculiarem *gryllis*, et quidem hiſce ſolis. Nihil profecto fruſtra vel temere creavit, nil molitur inepte Numen ſapientiſſimum. Docebit olim experientia, quo valeat iſthæc ſingularis gulæ in *gryllis* Fabric. conformatio. Sed de hoc nunc quidem hactenus.

Tranſeo

Trahseo ad aliud argumentum circa *locustas* Fabricii, quod, tamquam propriam et primariam hujus schediasmatis materiam, ita pertractare conabor, ut quantum inde, non modo ad hujus generis species rite definiendas, verum in universam adeo entomologiam utilitatis redundet, manifesto appareat. Pertinet vero hæc recens observatio ad ocellum dorsalem in basi hemelytrorum, quem clarius, vel item occultius conspicuum, gerunt mares omnium formarum, quæ merito sunt referendæ ad genus naturale, quod Fabricius sub nomine *locustæ* constituit, sive ex disciplina Linnæi ad illam tribum *gryllorum*, quam *Tettigonia* inscripsit. Quum in supra laudato museo, ea, qua par erat sedulitate, *locustas* examinarem, ut unam quamque vindicarem suæ propriæ et genuinæ speciei, nomineque debito insignirem: incidi quoque in exemplaria, quorum hemelytra juxta basin ocello fenestrato perquam distincte notata reperirentur. Simul atque hoc animadverti, ultro nimirum delatus sum ad illas locustarum species, quibus sagax naturæ interpres Fabricius nomen ex hoc charactere imposuerat, videlicet ad locustam perspicillatam, specularem et perforatam. Sed mox edoctus sum, hanc species hujus generis determinandi viam, in errorem citius, quam ad veritatem perducere. Primum enim incidi in specimina, tali ocello speculari prædita, sed alioquin a characteribus reliquis apud Fabricium enumeratis, toto cœlo diversa. Deinde manifesto deprehendi alia exemplaria, penitus illis, ocello dorsali vitreo notatis conformia, præter solum hunc ipsum ocellum; aut caudam ensiferam, pro certo charactere sexus feminini gerentia. Ilicet animus tulit, librorum abjicere suppellicem, viamque proprio studio pandere, atque ex labyrintho fugam quærere, ope logices artificialis, quæ instar fili Ariadnei, fida superat, errores proprios alienosque relecturo, dux atque magistra, ubi magna pars litteratorum hominum, et præsertim naturæ curiosorum, Pythagorico more, cum haud sordidis naturæ verique auctoribus in alia omnia descendere, quam sibi sapere, suaque sponte, abditam perplexis

plexis latibulis veritatem inveſtigare, mavult. Poſtquam ex inductione, incompleta illa quidem nimirum, attamen multorum exemplorum, mihi conſtitit, ocellos illos dorſales juxta baſin hemelytrorum, in ſolis maribus *locuſtis* exſiſtere; contra vero feminas, enſe partumeio in hoc genere facile adgnoſcendas, ſemper exhibere baſin illam planam ac ſimplicem: oppido intellexi, ſæpe jam commemoratos ocellos, utpote conſtantem et peculiarem maſculæ ſortis notam, nulla ratione pro charactere ſpecifico in hoc genere poſſe adhiberi. Alios igitur profecto characteres anquirendos eſſe, in ſexum ſequiorem pariter quadraturos. Mox unde oriantur ocelli, quove ex mente optimi maximi creatoris ſpectent inveſtigare ſuſtinui. Hoc agens ingreſſus ſum ſpeculationem, quam a tot ſagaciſſimis entomologis huc uſque neglectam fuiſſe miror. Omnia nempe inſecta, quæ *hemiptera* nuncupare Linnæo placuit, dummodo non omnino carent elytris, gerunt hemelytrum dextrum, qua marginem baſeos internum, ſub interno margine baſeos hemelytri ſiniſtri reconditum. Hæc ratio latius valet, ultra *gryllos* et *locuſtas*, non modo *Ulonata* cuncta, verum etiam *Rhynchota* Fabricii pleraque, ſub communi formula complectens. Donec nempe hemelytra illa, ſive hemipterorum elytra, in ſitu naturali jacent, neque externa quadam violentia loco ſuo mota ſunt, neque ad volandum expanſa: ſemper baſis elytri dextri, qua partem internam, ſub margine interiore baſeos elytri ſiniſtri latet. Hinc emendandus eſt character artificialis ordinis hemipterorum, ſub quo duo ordines naturales *ulonatorum* et *rhynchotorum*, ex diſciplina Linnæi militant. Vera enim et unica omnium illuc relatorum congruentia, in eo conſiſtit, quod baſis elytri ſiniſtri tegit marginem interiorem baſeos elytri dextri. Si fatendum, quod res eſt, pauciſſima modo inſecta hemiptera ſunt prædita veris hemelytris, ſive alis ſuperioribus elytris dimidiatis, vel uno certoque ſenſu ſemicoriaceis. Longe enim diverſa ratio eſt, utrum elytra ſint verſus baſin coriacea, ſed verſus apicem pellucida, veluti in cimicibus; an vero tota quoad

ſub-

substantiam membranacea, vel quasi mediæ cujusdam inter crustaceam coleopterorum et scariosam neuropterorum naturæ, quem ad modum in *blattis, gryllis, fulgoris, cicadis*, &c. reperimus. Non est mei instituti, hic de omnibus ulonatorum et rhynchotorum generibus, ne dicam formis singulatim exponere, aut varia discrimina, quæ circa eorundem alas, pro generis, speciei, varietatis et sexus diversitate, obtinent, curate persequi. Alioquin operæ pretium foret, utrumque systema Linnæanum et Fabricianum ad ipsius naturæ obrussam exigere; atque ex universo habitu demonstrare, an et quatenus illi duo naturales ulonatorum et rhynchotorum ordines, ad unum artificialem hemipterorum combinari mereantur. Sed ne longius a proposito nostro divagemur; ulteriorem hanc disceptationem omittentes, nunc exempli causa solummodo monebimus, ex neglectu modo laudatæ observationis, ortam esse falsam descriptionem *Blattæ Petiverianæ*. Fabricius (*Entomol. system. tom.* 2. *pag.* 9. *n.* 16.) hanc ita definit: "Blatta nigra, elytris maculis quatuor flavescentibus." Genus quidem suo jure emendavit, est enim utique insectum hoc *blatta*, sicuti jam Pallas recte docuerat; sed differentiam specificam perperam repetit a *Cassida Petiveriana* Linn. syst. nat. 2. pag. 578. n. 28. quum debuisset desumere a *cassida septemguttata* Linn. pag. 577. n. 19. quam merito huc eodem refert. Est enim profecto: blatta nigra, coleoptris maculis septem albis. Errat quidem ibi Linnæus, dum scribit: "elytra singula maculis tribus albis, longitudinaliter "digestis rotundis; et in medio unica utrisque elytris communi." Potius ita res habet: elytrum sinistrum, præter tres maculas rotundas longitudinales albas aut si mavis flavescentes habet insuper quartam in margine interiore sinistri elytri, qui alterius dextri marginem interiorem ultra basin obtegit, quemadmodum in reliquis etiam blattis plerisque esse fierique solet.

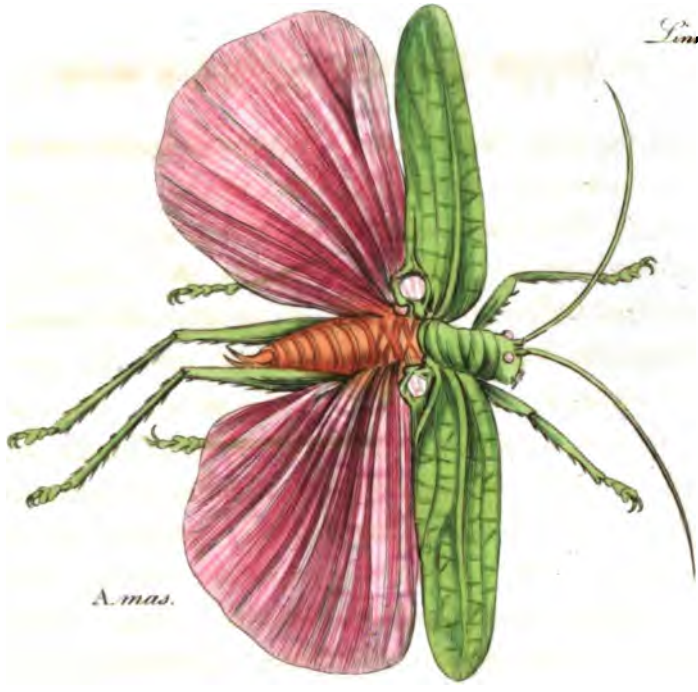
Jac. Petiverius *Gazophylac. tab.* lxxi. *fig.* 1. primam dedit hujus insecti figuram, in qua falso utrumque elytrum gaudet quatuor maculis.

culis. Præter maculam ad marginem interiorem elytri dextri, et alarum defectum, icon et descriptio bene cum natura conveniunt. Illustrissimus Pallas in *Spicil. Zool. fasc.* 9. *tab.* 1. *fig.* 5. dedit figuram apprime bonam, in qua, sicuti natura postulat, elytrum sinistrum est superius et quadriguttatum, dextrum vero inferius gaudet modo guttis tribus. Sulzer, *Hist. Insect. tab.* 11. *fig.* A. B. omnia invertit, ut in iconibus chalcographicis fieri solet, quando imagines temere ita æri inciduntur, quemadmodum in ipsa natura vel in adumbratione prototypa exstant. Hinc fit, ut elytrum dextrum loco sinistri superius et quadrimaculatum evadat. Herbst, *Archiv. Ins. tab.* 49. *fig.* 7. dedit figuram coloribus illustratam, exacte cum ipsa natura convenientem; in textu vero, *pag.* 185. solummodo de alarum inferiorum præsentia locutus, reliqua pristinarum figurarum vitia, circa numerum macularum in elytro dextro et sinistro, plane silentio prætermisit.

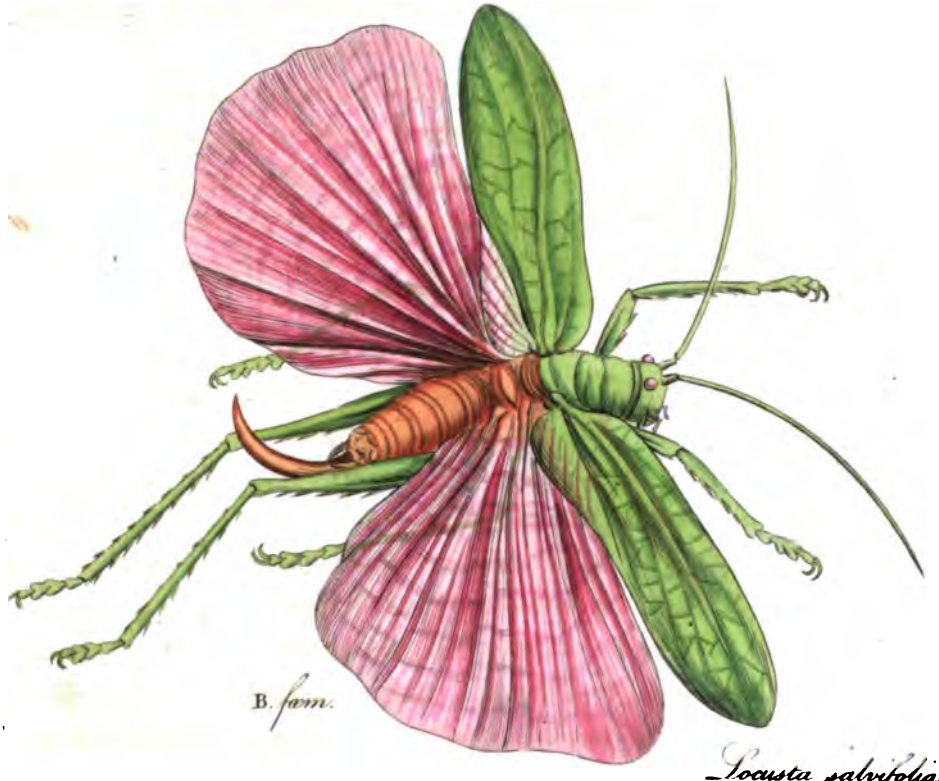
Verum relinquamus *Blattas*, de *Locustis* ex professo disputaturi. In hoc genere nempe non solum, ut in omnibus hemipteris, basis elytri sinistri obtegit marginem internum dextri, verum etiam in maribus, hic ob defectum ensis partumcii facillime agnoscendis, eadem isthæc basis elytri sinistri, ope alicujus scrobiculi rotundi, satis firmiter compaginatur cum scrobiculo simili, at paulo ampliore et profundiore, juxta marginem interiorem elytri dextri exsistente. Recipit enim inferius illud acetabulum dextrum parte sua concava alterius desuper ingruentis elytri convexam apophysin, ut inde oriatur quasi quædam temporaria synarthrosis, ferme in eundem modum sicuti clausuræ fibularum, vel potius instar contignationis, qua florum papilionaceorum alæ, carinæ eorundem, citra symphysin, satis firmiter inhæresciunt. Prouti vero capitulum illud, basi elytri scævi adnatum, amplum vel exiguum est, ita dextrum acetabulum huic recipiendo inserviens, plus minusve in conspectum venit. Neque hoc semper proportione totius corporis, ut major *Locusta* etiam ma-

jorem gerat ocellum fibularem. At acetabulum dextrum in omnibus masculis cujusvis speciei sine discrimine clarius patescit, atque oculi fenestrati similitudinem manifestiorem præ se fert, quam capitulum fibulare sinistrum in eadem specie, imo in eodem exemplari. Utrumque illud instrumentum vix in visum cadit contemplanti *Locustam viridissimam* Fabric. n. 32. Contra vero liquido apparet in *Locusta varia* Fabric. n. 35. quamvis illa major, quamvis hæc minor existat. Negari quidem nullo modo potest, longe certissime elucescere has partes, in illis *Locustarum* formis, quarum mares Fabricius, sub nominibus *Locustæ perspicillatæ*, *specularis* et *perforatæ* descripsit. Nihilo tamen secius in omnibus quoque reliquis *Locustis* Fabricii, videlicet præter omnino apteras, vestigia ejusdem fabricæ, etiamsi haud ubique pariter manifesta, deprehendet cordatus et sagax arbiter, quotiescunque specimina sexus masculini curate ac subtiliter examinabit. Depingi curavi *Locustam*, elytris lanceolatis concavis viridibus, alis rubris, quam sub nomine *locustæ salvifoliæ* descripsi in Catalogo Musei Holthusiani, *sect.* 3. *pag.* 82. *n.* 72. Mas hujus novæ speciei (*vid. tab.* 5. *fig.* A.) gerit juxta basin elytrorum ocellum dorsalem fenestratum; fœmina vero (*fig.* B.) ense partumeio insignis, habet marginem internum ibidem pariter incumbentem sinistrum dextro, at prorsus simplicem et planum. Utcunque magna intercedit inter hanc nostram *salvifoliam* et *Locustam perspicillatam* Fabric. n. 10. similitudo, non tamen pro eadem specie habere licet, quoniam laudatus auctor de rubro colore alarum plane tacet, quem neutiquam prætermisisset tam oculatus arbiter. Quando idem ocellum dorsalem fenestratum cum ense adscendente extrorsum craffiore conjungit, certissime aliquis error, qualiscunque demum est, latet, sola curata contemplatione exemplaris Hunteriani extricandus. Ex comparatione omnium *Locustarum* quas unquam oculis usurpavi, pro certo mihi constat, illos ocellos fenestratos esse perpetuum et constantem characterem sexus masculini, numquam cum ense, fœminis

Linn. Trans. IV. tab. 5. p. 58.



A. mas.



B. fem.

Locusta salviifolia.

in hoc genere proprio, co-exiſtentem. Cæterum ipſum illud ſplendidorum colorum jubar extra omnem dubitationis aleam ponit, quod utrumque illud inſectum *fig.* A. et B. depictum ſolummodo ratione genitalium et baſeos elytrorum qua marginem interiorem differat, ideoque manifeſto ſit pro duplici ſexu unius ejuſdemque ſpeciei reputandum. Fac igitur, id quod, donec probetur contrarium, pro vero certoque defendere valeo, cunctas *Locuſtas* mares gaudere acetabulis dorſalibus, plus minuſve ocellaribus ſive feneſtratis; contra vero fœminas margine interiore juxta baſin elytrorum plano; atque hunc characterem ſexualem in hoc genere naturali a Fabricio rite conſtituto, non minus eſſe conſtantem, quam præſentiam vel defectum enſis partumeii: cui bono hanc ſingularem ſtructuram optimum maximum naturæ opificem machinatum eſſe dicemus? Utinam univerſa teleologia tam prona foret adeoque expedita: tunc licet, me ultro auctorem ſyſtematis teleologici exſtiturum eſſe, profiterer. Nihil profecto aliud egit aut agere potuit ſummus rerum naturæ arbiter Deus, quum maſculæ ſorti daret alas ſuperiores ita diverſas ab elytris fœmineis, niſi ut *Locuſtas* femellas, utpote ovorum ſequeſtras, proliſque futuræ cara pignora, pro conſervandis ſpeciebus, ita tutiſſime ab ingruentium hoſtium injuria defenderet; mares contra, poſt impregnata fecundo coitu ova, nulli alteri amplius in œconomia naturæ, uſui futuros, proſcriberet, atque volucribus et inſectis zoophagis in prædam traderet. Quando nimirum avis vel alius qualiſcunque hoſtis appropinquat *Locuſtarum* gregi; fœminæ extemplo expedita elytra explicare, in alas ſe conjicere, volatuque fugam capeſſere valet. At rurſus mares, præſertim veneris uſu debilitati, ſiniſtrum elytrum (ut ipſum ex acetabulo dextro, cui per apophyſin illam baſeos qua marginem internum inhæreſcit, tollant) magno conatu lentoque ſucceſſu levaturi, occupantur interim ab adverſariis, qui, ſaginati maſcula præda, fugaces matres ſtudioſe perſequi negligunt, commodiore eſca contenti. Quid? quod eadem hac

structura consultum voluit sapientissimi numinis providentia gravidis, ne salaces mares invitas illas vana et præpostera libidine vexarent. Coitus *Locustarum* non potest aliter peragi, nisi elytris complicatis. Hinc mares ægre se allevantes, nullo modo violenter comprimere queunt altius succinctas multoque expeditiores fœminas. Nec tamen sese exhibuit iniquum contra mares *Locustus* creator sanctissimus idemque indulgentissimus. Nam cantum illis dedit, fatalium sibimet ipsis alioqui partium attritu prurientes fœminas virgines allecturis, ne cælibes repulsæ tædio fatigati animum desponderent, aut contra naturam inter semetipsos veneris diverticula quærerent. Quamvis ergo *Locustæ* mares, præ aliis aliorum generum insectis masculini sexus, pro salute fœmineæ sortis devoti et pessundati esse videantur, attamen blanda mercede redimuntur, magnoque gaudent privilegio, quod cum paucis modo, præsertim cum *Cicadis*, commune habent, scilicet ut fœminæ, arguti ac sonori stridoris dulcedine captæ, ultro petant amplexus, dum citra molestæ verecundiæ delicias ipsæ conscendunt miseros inopesque amasios, ab ambitiosæ persecutionis labore immunes. Idem alia quadam ratione in pulicibus fieri constat, etiamsi in tam parvis causa cur ita rem habeant investigatu difficilis lateat.

Neque vero in solis *Locustis* vel adeo hemipteris obtinere videtur talis alarum pro variante sexu diversitas, quam solers natura ob similem scopum videtur esse machinata. *Lepidoptera* Linnæi, sive *Glossata* Fabricii, magna ex parte produnt istiusmodi providæ naturæ molimina. Multi *Papiliones*, præsertim *Heliconii*, peculiares gerunt elateres, alarum remigio, vel potius velificanti aërio cursui, pro sexus varietate diversimode inservientes. *Sphinges* mares reperiuntur præditi fibulis pro ala superiore cum inferiore constringenda relaxandave, quibus carent fœminæ, alio mechanismo pandentes et rursus contrahentes Dædalea vela. Qua de re exstat singularis lectu dignissima commentatio in Transactionum Societatis Linnæanæ Londinensis vo-

lumine primo, cujus uberior diſcuſſio non eſt mei præſentis inſtituti. Cæterum ipſa inſecta *aptera* Linnæi, ac præſertim *agonata* Fabricii, magna ex parte illam habent indolem, ut mares, ad analogiam quaſi quamdam multarum plantarum dioicarum, citius ad maturitatis ac robuſti vigoris florem pertingant, et rurſus, peractis nuptiis, multo celerius e rerum natura quotannis evaneſcant, quam fœminæ, quas pro ſobole ad maturitatem perferenda diutius ſuperſtites manere fas eſt. Sic, verbi cauſa, *Gammarus ſtagnalis* (Fabric. *Entomol. Syſtem. tom. II. p.* 518. *n.* 11.) cujus deſcriptionem noviſſimam atque curatiſſimam debemus viro experientiſſimo doctiſſimoque Georgio Shaw Med. Doct. (*Tranſact. of the Linn. Soc. vol. I.*) inſectum in foſſis quibuſdam prope Hamburgum ſatis frequens, quotannis, apparet circa initium veris, et quidem eo ordine, ut primum ſtatim poſt glaciei niviſque regelationem parva nec dum adulta ſoboles utriuſque ſexus reperiatur, inter quam maſculi celerius ad juſtam perfectamque magnitudinem excreſcere ſolent. Hi quidem cum femellis paulo poſt ipſos adultis co-exſiſtunt et nuptias celebrant, quibus peractis mox evaneſcunt mares, relictis ſolis viduis pregnantibus, quæ brevi tempore ante fervorem æſtatis foſſas exſiccantem moriuntur, poſtquam ova in limo depoſuerunt. Limus ille per æſtatem dureſcit atque in pulverem abit, auctumno demum imbribus madeſcit, nec tamen in noſtro climate umquam excluduntur ova ante hiemem. In agro Brunſvicenſi per auctumnum quoque hunc *Gammarum ſtagnalem* me in perfectæ ætatis robore vigentem videre memini, ſed nunquam circa Hamburgum. Obiter hæc monuiſſe ſufficiat. Univerſa quidem per omnia omnium claſſium genera diſquiſitio, quænam animalia et præſertim inſecta fœmineæ ſortis, ope ſingularis providentiæ, præ maſculis diutius ab interitu defendi et conſervari ſoleant, forſan neque jucunditate careret, neque uſu œconomico. Sed profiteor, me nondum ſufficientes obſervationes circa generalem illam fœminei ſexus prærogativam inſtituiſſe, vel inſtitutas ſatis rite digeſſiſſe.

digeſſiſſe. Hoc ſaltim jam nunc pro certo affirmare auſim, multo latius patere hanc rationem, quam ut de inſectorum quibuſdam generibus ſolummodo valeat. Piſces certo multi, præcipue *branchioſtegi* et *chondropterygii*, per certas anni tempeſtates nulli niſi fœminei ſexus capiuntur. Sed, ut unde ſum digreſſus denique redeam, *Locuſtas* Fabricii, præſertim exoticas, fœminas multo plures quam ſexus maſculini in omnibus vel maximis muſeis deprehendi, conſtans et perpetua experientia docet. Neque hoc mirum videbitur amplius cordato entomologo, conſideranti quanto diutius inſectorum plurimorum fœminæ ſuperſtites manere ſoleant, quam mares ejuſdem ſpeciei. Idem in primis manifeſtum eſt in genere *Mantis*, cujus curatiſſimam elaboravi monographiam, quam entomologorum facile princeps Fabricius vehementer approbavit, et quam elegantibus figuris illuſtratam publici juris facere haud gravabor.

VI. *A New*

VI. *A New Arrangement of the Genus Polytrichum, with ſome Emendations. By Mr. Archibald Menzies, F. L. S.*

Read February 7, and March 7, 1797.

IT is not my intention to preſent you with a long and tedious hiſtory of the genus *Polytrichum*; my objects are merely to eſtabliſh, by your ſanction, what I conceive to be its true and obvious characteriſtics, and to diſcriminate the different ſpecies, by laying before you, with due diffidence, the following arrangement, in which you will readily perceive that I have added ſeveral new ones, and ſeparated ſome of the moſt conſpicuous varieties of authors into diſtinct ſpecies. This led me on to form new deſcriptions, and to new-model the whole genus.

At the time this genus was firſt deſcribed, there were but few ſpecies of it known; conſequently its character could not be made ſo general, nor its arrangement ſo complete, as when a much greater number of ſpecies are at once before us. Indeed it is pretty evident that Linnæus took its character chiefly from the *Polytrichum commune*, and what were conſidered as its varieties, as we find ſo much ſtreſs laid upon the *apophyſis* at the baſe of the capſule, that, for want of that ſingle diſtinction, three ſpecies were then excluded, and forced with diſcordant characteriſtics into another genus, under the name of *Mnium Polytrichoides*, and varieties: and although ſome of theſe have been ſince reſtored to their proper place, on account of their natural affinity, yet we find but few ſatisfactory attempts

tempts made to amend the general character of the genus; though it is very clear that the character taken from the *apophyſis* ought to have been long ago excluded, or rather ought never to have been admitted, as it was only to be found in a few ſpecies, and therefore could not with propriety be conſidered as a generic diſtinction.

The laborious works of the celebrated and perſevering Hedwig have, of late years, thrown much light upon the ſubjects of this natural order; but the general complaints againſt his new arrangement of it are, that his genera are too artificial, and that their characters are taken from parts ſo minute and difficult to examine, that they rather tend to perplex and diſcourage a young beginner in his inveſtigations, than aid his purſuits in acquiring a ſcientific knowledge of this intricate tribe. While it can therefore be avoided, no generic or ſpecific characters ought ever to be adopted, that cannot eaſily and diſtinctly be ſeen by the aſſiſtance of a ſingle lens magnifier, ſuch as Botaniſts commonly carry in their pockets.

Hedwig's generic characters have indeed this recommendation, that they are ſhort and extremely beautiful upon paper, on which account his character of this genus has been lately adopted by authors whoſe erudition and general accuracy none can admire with more profound reſpect than I do; yet I cannot join them in this inſtance without offering violence to a beautiful and natural family, merely becauſe its individuals differ only in the number of ſmall dents in the *periſtomia*, or rim of the capſule; ſome having thirty-two dents, others about double that number.

For theſe reaſons I have not ventured to place much dependence on Hedwig's new character of this genus, more eſpecially as it brings together plants which have ſo little natural affinity: of this we have an example, in his making the *Bryum undulatum* a *Polytrichum*, though it agrees in no other reſpects with this genus than merely

merely in the number of minute dents, and general ſtructure at the orifice of the capſule.

This author's ſtrict adherence to theſe very minute characters has made him regardleſs of others more conſpicuous, and induced him to place another plant under this genus, viz. the *Polytrichum hircinicum*, which, from its ſingle calyptra with upright hairs, more obviouſly, and perhaps more naturally, belongs to one of his new genera. I ſhall therefore in the following arrangement be obliged to exclude theſe two ſpecies of Hedwig: nay, I muſt go further; many authors, and thoſe too of great reſpectability, have placed the *Bryum ſtriatum* of the *Species Plantarum*, and its varieties, under this genus, although they have not the moſt diſtant affinity, and, according to the generic character I have adopted, cannot poſſibly be arranged under it. Hedwig has, I think, very properly deſcribed theſe varieties as diſtinct ſpecies, and placed them under a new genus, which he calls *Orthotrichum;* and though I am not at preſent much inclined to adopt his minute diſtinctions, or follow him in his revolutionary career through this natural order, yet I cannot help conſidering this genus as a real improvement, and ſhall endeavour at a future opportunity to lay ſome account of it before the Linnean Society, as my late peregrinations have enabled me to enrich it with a conſiderable number of new ſpecies.

Having thus excluded theſe ſeveral ſpecies, and ſeemingly mutilated the genus, it now remains for me to eſtabliſh its characteriſtic; and this I am happily enabled to accompliſh by means of that ingenious diſcovery of the double calyptra, made upwards of twenty years ago, and nearly about the ſame time, by two celebrated Naturaliſts, who were then unacquainted with each other's labours, and conſequently may both be conſidered as equally entitled to the merits of this improvement. It was firſt publiſhed in the year 1775, in Leers's *Flora Herbornenſis*, where, after deſcribing the *Poly-*

trichum commune, page 229, the author makes the following obſervation:

"*Polytrichum hoc calyptrâ gaudet duplici: exteriore piloſâ, interiore multo minore, membranaceâ, albidâ, lævi; exteriore obtectâ.*"

I do not find that Leers made any practical application of this diſcovery, or traced it in any other ſpecies: but Mr. Curtis, a valuable member of this Society, who made the ſame diſcovery the year following, purſued it further, and finding the double calyptra conſtant in other ſpecies as well as the *Polytrichum commune*, he applied it, with his uſual perſpicuity and diſcernment, as a diſtinguiſhing character of the genus, in one of the numbers of his *Flora Londinenſis*, publiſhed in the year 1778; and I am confident that a more beautiful or a more obvious one could not be ſelected, having found it conſtant and invariable in every ſpecies here deſcribed, except the *Polytrichum magellanicum*, which has only a ſingle ſmooth calyptra; but then it ſo ſtrongly poſſeſſes the peculiar habits, and every other characteriſtic of the genus, that I think it cannot poſſibly be ſeparated. I have therefore drawn up the following general character, which, with the above exception, will be found applicable to every individual of this natural family.

POLYTRICHUM.

Natural Character.

THE plants of this genus, whether ſingle or branched, grow moſtly erect from the ground, and have an unpliant ſtiffneſs or rigidity of appearance that peculiarly diſtinguiſhes them from moſt others of this natural order.

The *leaves* are generally thick, tough, and rigid, growing round the ſtems and branches without order, and preſſing cloſe or half-embracing them by broad, ſheathy, membranaceous baſes.

The *peduncles* are ſmooth, ſtiff, ſhining, erect, and for the moſt part ariſe from the ſummits of the ſtalks and branches, out of a cylindrical membranaceous tube or *perichætium*, that cloſely ſurround the baſe of each.

The *capſules* are of various forms, as roundiſh, quadrangular, and oblong; and each has a pointed lid or *operculum*, with a thin tranſverſe central membrane underneath; and when theſe are removed or fallen off, the rim of the orifice appears elegantly fringed with a regular row of incurved minute dents (either thirty-two dents, or about double that number), which before maturity are connected by their tips to the central membrane.

The *calyptra* is double, one within the other; the exterior one is compoſed of ſhining woolly hairs, cloſely matted together, and is generally of a conical figure, lacerated in a looſe manner at the baſe, but compact at the top, where it is cloſely united to the inner one, and is, for the moſt part, about double its length: the interior one is ſmall, ſubulate, ſmooth, tough, and membranaceous; but, as the capſule ſwells, it burſts open on one ſide from the baſe upwards for half its length or more.

Character eſſentialis.

Capſ. operculata, ſubrotunda, oblonga ſeu quadrangula.
Periſt. dentatum: dentibus incurvis (32—64) apicibus membranâ tranſverſâ adglutinatis.
Calypt. duplex: interior lævis, membranacea, minuta: exterior floccoſa, apicibus unitis.
Mas diſciformis, in diſtincta planta.

SPECIES.

* *Acaulia.*

1. POLYTRICHUM *tenue*, fol. lanceolatis accuminatis adpreſſis integerrimis, capſula cylindrica erecta.

MNIUM *polytrichoides var. γ. Linn. Sp. Pl.* 1577. *Dill. Muſc.* 434. *t.* 55. *f.* 12.

Hab. in Nova Scotia, locis ſterilibus prope Halifax.

The *leaves* of this are but few in number, and preſs cloſe round the baſe of the peduncle; the inner ones are longer and more acutely pointed than thoſe on the outſide; they are thin, lanceolate, ſharp-pointed, and entire on the edges, with a ſtrong middle nerve; and in a dried ſtate they are of a reddiſh brown colour.—The *peduncle* is nearly an inch long, of a deep ſtraw-colour, and cloſely ſurrounded at the baſe by a tubular *perichætium*.—The *capſule* is cylindrical and erect; the *operculum* reddiſh, almoſt flat, and ſlightly pointed in the centre.—The exterior *calyptra* is of a light ſtraw-colour, and ſomewhat more than double the length of the inner one, which is ſmooth and of the ſame colour, but ſomewhat paler.

2. POLYTRICHUM *ſubrotundum*, fol. lanceolatis obtuſis integerrimis rigidis, capſula turbinata erectiuſcula.

MNIUM *polytrichoides Linn. Sp. Pl.* 1576. *Dill. Muſc.* 428. *t.* 55. *f.* 6. A. B. C. D. E. F.

P. *ſubrotundum Hudſ. Fl. Angl. ed.* 1. 400. *Scop. Fl. Carn.* 134. *n.* 2. *Vaill. Par.* 131. *tab.* 26. *f.* 15.

P. *pumilum Swartz. in Act. Stockholm.* 1795. *p.* 271.

Hab. in ericetis, et locis ſterilibus Angliæ, &c.

This

This has no *ſtalk*.—The *leaves* are lanceolate, obtuſe, thick, ſhort, and rigid, without any apparent middle nerve, and entire on the edges: they are crowded round the baſe of the peduncle; of a dark green colour when recent, but blackiſh when dried.—The *peduncle* is from a quarter to about three quarters of an inch long, of a dark reddiſh colour, and ſurrounded at the baſe by a vaginal *perichætium*.—The *capſule* is ſhort, turbinated and ſomewhat erect: the *operculum* is flat, but pointed in the centre, and the rim is conſpicuouſly fringed with minute dents.—The exterior *calyptra* is conical, of a dark ferruginous colour, and about twice the length of the inner one.

Dr. Swartz having lately ſent me a ſpecimen of his P. *pumilum*, I carefully compared it with the above, and found it to be the ſame ſpecies.

3. POLYTRICHUM *nanum*, fol. lanceolatis obtuſiuſculis, apice obſcurè ſerrulatis, capſula hemiſphærica cernua.

MNIUM *polytrichoides Linn. Sp. Pl.* 1576. *Dill. Muſc. tab.* 55. *f.* 6. G. H. I. K. L.?
P. *nanum Hedw. Stirp. Crypt. vol.* 1. 35. *tab.* 13.
Hab. in ericetis, et locis aridis Angliæ, &c.

This ſpecies has ſcarcely any *ſtalk*.—The *leaves* are lanceolate, ſomewhat obtuſe, and entire on the edges towards their baſe, but ſlightly ſerrulated towards their tips: they are not ſo thick and ſtiff as in the preceding ſpecies, but are ſomewhat longer.—The *peduncle* is from half an inch to upwards of an inch long, of a deep orange colour, and ariſes out of a vaginal *perichætium* about one tenth of an inch long.—The *capſule* is ſhort, hemiſpherical, a little inclined or ſomewhat nodding, and the rim is beautifully fringed with

with minute dents: the *operculum* is flat, but in the centre very ſlightly pointed.—The exterior *calyptra* is ſhort and conical, ending in a ſmall *mucro*; it is of a light ferruginous colour, and double the length of the inner one.

This and the preceding ſpecies have been confounded together by moſt authors, although they appear very diſtinct; and I am doubtful whether Dillenius himſelf has not fallen into this miſtake, as he ſeems to have given both under the ſame figure: but having delineated them on two ſeparate papers in his original drawings, which are in Sir Joſeph Banks's library, there is reaſon to ſuppoſe that he originally intended them to be diſtinct ſpecies.

** *Caule ſimplici.*

4. POLYTRICHUM *aloides*, fol. lanceolatis conniventibus obtuſiuſculis rigidis apice ſerratis, capſula cylindrica obliquata.

MNIUM *polytrichoides var.* β. *Linn. Sp. Pl.* 1577. *Dill. Muſc.* 429. *t.* 55. *f.* 7. *Vaill. Par.* 131. *t.* 29. *f.* 11. *Weiſs Crypt.* 173.
P. *nanum Lightf. Fl. Scot.* 701. *Hudſ. Fl. Angl. ed.* 2. 470.
P. *aloides Hedw. Stirp. Crypt. vol.* 1. 37. *tab.* 14.
Hab. in ericetis, et locis ſterilibus Angliæ, &c.

The *ſtalk* of this is about a quarter of an inch high.—The *leaves* are of a dark green colour, and preſs cloſe together round the ſtalk, eſpecially in a dried ſtate: they are thick, lanceolate, ſomewhat obtuſe, and finely ſerrated towards their tips.—The *peduncle* is from half an inch to an inch long, of a deep ſtraw-colour tinged with red, and iſſuing from the top of the ſtalk out of a tubular *perichætium* about a tenth of an inch long.—The *capſule* is cylindrical and a little

little oblique, with a flat *operculum* pointed in the centre.—The exterior *calyptra* is of a light ferruginous colour, eſpecially towards the tip, and is double the length of the inner one.

5. POLYTRICHUM *convolutum*, fol. linearibus involutis apice ſerratis; ſiccitate contortis, capſula cylindrica erectiuſcula.

P. *convolutum Linn. fil. Method. Muſc.* 33. *t.* 1. *f.* 3. *Swartz Prod.* 139.
Hab. in India occidentali, &c.

The *ſtalk* is erect, and varies from an inch to about three inches in height.—The *leaves* are longer and more crowded towards the top of the ſtalk: they are ſlender, linear, with their edges finely ſerrated towards their tips; and in a dried ſtate they are of a dark brown colour, with their edges turned in, ſo as to appear channelled.—The *peduncle* is from an inch to an inch and half long, iſſuing from the ſummit of the ſtalk out of a looſe tubular *perichætium* about a quarter of an inch long.—The *capſule* is ſomewhat erect, ſhort and cylindrical, with a ſtrong rim finely dentated.—The exterior *calyptra* is of a light ferruginous colour, and about two-thirds longer than the inner one.—The male roſaceous cups are produced upon the ſummits of ſeparate ſtalks, and are ſometimes proliferous.

6. POLYTRICHUM *magellanicum*, fol. lineari-lanceolatis acutis denticulato-ſerratis, capſula oblonga ſub-cylindrica erectiuſcula, calyptra ſimplici. TAB. 6. FIG. 1.

P. *magellanicum Linn. Suppl. Plant.* 449.
Hab. in freto magellanico, et in Nova Zeelandia.

This grows ſtiff, erect, and from two to even ſix inches high: the lower part of the *ſtalk* is naked, but the upper part is ſurrounded

rounded with ſpreading leaves, which are longer and more copious at the termination of each year's growth and round the baſe of the peduncles.—The *leaves* are long, ſpreading, linear-lanceolate, and ſerrated with deep dents on their edges: in a dried ſtate they are of a reddiſh-brown colour, and their edges turn in, ſo as to give them a round or ſubulate appearance.—The *peduncles* are ſhining, of a light ſtraw-colour, and from two to three inches long, iſſuing out of a tubular *perichætium* from the ſummit of the ſtalk; but as a young ſhoot frequently iſſues from near their baſe, the peduncle thereby becomes lateral, and thus there are often two on the ſame ſtalk, one terminal and the other lateral.—The *capſule* is oblong, nearly cylindrical, and ſomewhat erect: the *operculum* is conical, with a long ſlender point turning ſideways.—The exterior woolly *calyptra* is wanting: the inner one, which is ſmooth, ſubulate, and of a dark brown colour, is about three tenths of an inch long, with a little roughneſs appearing about the point: as the capſule ſwells it ſplits ſideways from the bottom upwards.—The male roſaceous cups are proliferous, and upon ſeparate ſtalks, which in general produce ſtronger and more crowded leaves.

I was enabled to aſcertain this plant by carefully comparing it with the original ſpecimen of P. *magellanicum* in the Linnean Herbarium.

7. POLYTRICHUM *attenuatum*, fol. lineari-lanceolatis carinatis cartilagineo-ſerratis patulis, capſula quadrangulari cernua, baſi conſtricta. TAB. 6. FIG. 2.

Hab. in ora occidentali Americæ Septentrionalis.

The *ſtalk* of this ſpecies is ſimple, erect, and from an inch and half to upwards of three inches high.—The *leaves* are ſpreading, linear-lanceolate, with rough hiſpid points, and whitiſh cartilagineous edges deeply ſerrated; the middle nerve is ſtrong, whitiſh, and on the

the back ſlightly dentated towards the tip. When recent the leaves are of a dark glaucous colour, but in a dried ſtate they become rigid, and of a dark brown colour, with their edges curled in ſo as to make them appear round and channelled.—The *peduncle* is from two to four inches long, of a reddiſh ſtraw-colour at the bottom, but much lighter towards the top: it ariſes from the top of the ſtalk, out of a cloſe cylindrical ſheath about one-eighth of an inch long.—The *capſule* is quadrangular, nodding, and a little contracted at the baſe, but not ſo much as to form an *apophyſis*: the *operculum* is conical: the rim has about ſixty-four minute dents.—The exterior *calyptra* is ſtraw-coloured, of a pointed conical figure, and about a third longer than the inner one, which is ſmooth and of the ſame colour.

8. POLYTRICHUM *gracile*, fol. lanceolatis acutis carinatis denticulato-ſerratis erectiuſculis, capſula obovata ſubangulata obliquata, apophyſi deſtituta. TAB. 6. FIG. 3.

Hab. in alpibus Scoticis, Dickſon.—*et in Suecia*, Swartz.

This is ſimple-ſtalked, and of a ſlender appearance, from an inch to upwards of two inches in height.—The *leaves* are ſmall, and remotely placed on the lower part of the ſtalk; but are larger, erect, and more crowded towards the top: they are of a light green colour, ſhort, lanceolate, with acute hiſpid points, and ſerrated with deep dents on their edges: the middle nerve is ſtrong, whitiſh and dentated on the back, eſpecially toward the tip.—The *peduncle* is about three inches long, ſhining, and of a deep orange colour, and ariſes from the ſummit of the ſtalk out of a cylindrical ſheath about two tenths of an inch in length.—The *capſule* is nearly ovate, and obſcurely angulated, without any apparent *apophyſis*; the *operculum* is ſmall and conical, ending in a ſtraw-coloured point.—The exterior

calyptra is of a deep ferruginous colour, and about a third part longer than the inner one.

I was favoured with this ſpecies by Mr. Dickſon, who collected it on Ben Nevis in Scotland, about half way up the mountain. I alſo received the ſame from Dr. Swartz of Stockholm, who lately diſcovered it in Sweden. His ſpecimen has the lower leaves and calyptra black, which I conſider only as accidental diſtinctions. I was at firſt inclined to conſider it as a variety of P. *attenuatum*; but its ſlender appearance, its leaves being ſhorter, erect, and thinner ſet, and the difference in the form of its capſule, induced me to make it a diſtinct ſpecies; and I have ſome doubts whether it may not be the ſame which Dillenius has figured in *Tab.* 54. *fig.* 2. I have not however ventured to quote that figure till I am enabled to remove my doubts by a ſight of Dillenius's ſpecimen. Both this and the foregoing are to be diſtinguiſhed from P. *commune* by their carinated leaves, with ſtrong whitiſh middle nerves, by having no membranaceous leaves round the baſe of their peduncles, and no apparent apophyſis at the baſe of their capſules.

9. POLYTRICHUM *commune*, fol. lineari-lanceolatis acutis ſerrulatis, capſula quadrangulari, apophyſi ſubjecta.

P. *commune Linn. Sp. Pl.* 1573. *Dill. Muſc.* 424. *t.* 54. *f.* 1.
P. *ſerratum Schranck Fl. Bav.* 2. 446. *n.* 1371.
Hab. in ſylvis, et ericetis humidis.

The *ſtalk* is erect, from two to five inches and upwards in height.—The *leaves* are ſtiff, linear-lanceolate, ending in acute hiſpid points, and finely ſerrulated on their edges: they are of a bright green colour when freſh, but of a reddiſh brown when dried or in decay: thoſe on the top of the ſtalk, ſurrounding the baſe of the peduncle, differ from the others in being more erect, whitiſh, membranaceous, and

and entire on their edges, with greeniſh middle nerves, ending in long filaceous tips.—The *peduncle* is from two to four inches long, of a ſhining deep orange colour, and iſſuing from the top of the ſtalk out of a tubular ſheath about a quarter of an inch in length.—The *capſule* is quadrangular, with an *apophyſis* at the baſe, and is of a greeniſh colour when young, but reddiſh when ripe: the *operculum* is flat or rather concave, with a ſmall point projecting from the centre.—The exterior *calyptra* is ferruginous, and about double the length of the inner one.

10. POLYTRICHUM *piliferum*, fol. lanceolatis confertis integerrimis rigidis apice piliferis, capſula quadrangulari, apophyſi ſubjecta.

P. *commune var.* γ. *Linn. Sp. Pl.* 1573. *Dill. Muſc.* 426. *t.* 54. *f.* 3.
P. *piliferum Schreb. Spicil.* 74. *n.* 1031.
Habitat in ericetis, et paſcuis montoſis Angliæ, &c.

This grows ſingle, from half an inch to an inch and half in height, and is naked at the bottom, but at the top it is furniſhed with a crowded cluſter of leaves.—The *leaves* are ſhort, lanceolate, thick, ſtiff, and crowded, entire on the edges, and each tipt with a white hair.—The *peduncle* is ſtiff, reddiſh, and from half an inch to upwards of an inch in length, ariſing from the top of the ſtalk out of a tubular *perichætium*.—The *capſule* is ſmall, nodding, and quadrangular, with a diſtinct *apophyſis* at its baſe: the *operculum*, like the preceding, is concave, with a ſmall mucro iſſuing from the centre.—The exterior *calyptra* is ſometimes reddiſh, but generally of a dark ferruginous colour, and about as long again as the inner one.

11. POLYTRICHUM *juniperinum*, fol. lineari-lanceolatis mucronatis patulis, marginibus inflexis integerrimis, capsula quadrangulari, apophysi subjecta. TAB. 6. FIG. 4.

P. *juniperinum Willd. Fl. Berol.* 305 (exclusо Synon. Dillen.)
Hab. in ora occidentali Americæ Septentrionalis.

The *stalk* is erect, from two to three inches high, and rather naked at the bottom.—The *leaves* are spreading, linear-lanceolate, and ending with sharp points, slightly hispid: their edges are entire, and fold in flat upon the surface of the leaf from both sides.—The *peduncle* varies from an inch and half to about three inches in length, and is closely surrounded at the base by a cylindrical tube or *perichætium*, which is about a quarter of an inch long, issuing from the top of the stalk.—The *capsule* is quadrangular, with an *apophysis* at the base; the *operculum* is flat but pointed in the centre, and the rim is fringed with a regular row of about sixty-four whitish dents.—The exterior *calyptra* is long and subulate, whitish at the bottom, but ferruginous at the tip, and about double the length of the inner one.

All authors I know of, who have taken up P. *juniperinum*, describe it with entire leaves, yet make no scruple in quoting for it *Dill. Musc.* 424. *t.* 54. *f.* 2. which that accurate author describes and figures with serrated leaves: it is therefore very evident the quotation must be erroneous.

Note. The *Polytrichum pulverulentum* in *Gmel. Syst. Nat.* belongs, I believe, to this section; but as I have not been able to procure a sight of the plant itself, or even of the figure of it, quoted from *Reynar. Act. Lausann.* I could not take it up in this Arrangement.

**** Caule*

Fig. 6.

Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

**** Caule ramoſo.*

12. POLYTRICHUM *ſtrictum*, fol. lanceolatis acuminatis erectiuſculis, marginibus inflexis integerrimis, capſulis quadrangularibus, apophyſi inſidentibus. TAB. 7. FIG. 1.

Vaill. Par. 131. *t.* 23. *f.* 6.
Hab. in America Septentrionali, in locis ſterilibus Angliæ, et in Scotia.

This ſpecies was gathered in the year 1766 on Newfoundland by Sir Joſeph Banks, Bart. who deſcribed it under the foregoing name in a manuſcript preſerved in his library, which I was ſuffered to peruſe in the moſt liberal manner. I found it about twelve years ago near Halifax in Nova Scotia, and ſince that time in ſeveral places on the north-weſt coaſt of America; and I lately found it alſo in different places in Scotland, particularly on the top of the park walls, on both ſides of the road, about a mile to the eaſtward of Taymouth in Breadalbane, where it grows in common with P. *commune* and P. *piliferum*.

It is branched, and about two inches in height. The roots, together with the lower parts of the ſtem and branches, are covered with a whitiſh downy ſubſtance, of a ſpongy texture: the lower parts of the branches appear ſlender, from the leaves being ſmaller and more thinly ſet there than towards the tops, where the leaves are larger and more crowded.—The *leaves* are thick, ſtiff, erect, lanceolate and ſharp-pointed, with entire edges, which, like the preceding, are folded flat back to the ſurface of the leaf from both ſides: in a dried ſtate the leaves preſs cloſe to the ſtalk, and their points are ſlightly hiſpid: thoſe which ſurround the baſe of the peduncles are moſtly membranaceous and pellucid, with greeniſh middle nerves ending in ſlender filaceous tips.—The *peduncles* are from an inch to two inches in length, ariſing from the ſummits of the branches out of cylindrical tubes nearly

nearly a quarter of an inch long, which closely surround their base. —The *capsule* is small and quadrangular, with an *apophysis* at the base: the *operculum* is reddish and flat, with a small point issuing from its centre; and the rim of the orifice is fringed with about sixty-four minute dents.—The exterior *calyptra* is conical, of a light ferruginous colour, and about double the length of the inner one.

As this species generally divides very low down, single branches of it may be carelessly pulled up or separated, in which state it may sometimes be confounded with the P. *juniperinum*; but its being rather smaller in all its parts, its leaves being shorter, stiffer, more erect and crowded towards the top of the branches, and its lower parts being generally matted together and enveloped in a whitish downy substance, will easily distinguish it.

As neither the woolly calyptra nor the downy substance about the lower parts of the plant are expressed in Vaillant's plate, I have been induced to give a new figure of it, from a specimen collected in Nova Scotia.

13. POLYTRICHUM *contortum*, fol. lineari-lanceolatis serratis involutis siccitate contortis, pedunculis lateralibus, capsulis cylindricis erectiusculis. TAB. 7. FIG. 2.

Hab. in ora occidentali Americæ Septentrionalis.

This is from two to four inches high, and generally naked towards the bottom, but covered with leaves, and often divided into two or three branches towards the top.—The *leaves* are linear-lanceolate, with their edges turned in and finely serrated, without any apparent middle nerve: when fresh they are of a dark green colour; but in a dried state they are contorted, and of a dull dark brown colour: they are rather thinly scattered on the stalk, excepting here and there where they form tufts by being more thickly set and somewhat

what longer at the termination of each year's growth.—The *peduncles* are from an inch to an inch and half long, and ariſe out of a vaginal tube about a quarter of an inch in length, at the extremity of each year's growth; but as the young ſhoots iſſue from their baſe, they afterward become lateral.—The *capſule* is cylindrical and ſomewhat erect, having a ſtrong annulated rim fringed with about thirty-two minute dents: the *operculum* is conical and pointed.—The exterior *calyptra* is ſmall, of an oval form, and of a light ſtraw colour, and is about twice the length of the inner one.

This ſpecies very much reſembles P. *convolutum*, but that has always a ſimple ſtalk with a ſingle terminating peduncle, and its leaves are only ſlightly ſerrated towards their tips; whereas this, even in its ſimple ſtate, has generally two or three lateral peduncles, and the leaves are finely ſerrated their whole length, which will afford ſufficient marks of diſtinction.

14. POLYTRICHUM *rubellum*, fol. lanceolatis carinatis obtuſiuſculis ſerratis dorſo denticulatis, capſulis ſubcylindricis erectiuſculis. TAB. 7. FIG. 3.

Hab. in ericetis Scotiæ, et locis ſterilibus Angliæ.

The *ſtalk* of this ſpecies appears reddiſh, and is generally ſlightly branched, though not unfrequently met with ſingle, and grows from an inch to two inches in height.—The *leaves* are obtuſely lanceolate, and finely ſerrated on the edges, with the middle nerve dentated on the back of each: thoſe on the upper parts of the ſtalk and branches are of a dark glaucous colour, changing in the dried ſtate to a dull blackiſh hue; but the lower leaves, and the baſes of the upper ones, are reddiſh, and become whitiſh when dried; they are generally larger and more crowded at the top and at the diviſions of the branches.—The *peduncles* very ſeldom exceed three in number, and

are

are from an inch to an inch and half in length: they are reddiſh, ſlightly twiſted, and generally terminate the lower branches, each ariſing out of a cylindrical tube, about two tenths of an inch long.—The *capſule* is ſomewhat erect, and nearly cylindrical, having a ſtrong annulated rim, fringed with a regular row of reddiſh dents: the *operculum* is long and ſubulate.—The exterior woolly *calyptra* is ferruginous, and about double the length of the inner one.

The only plant which this reſembles is P. *aloides*, and I ſtrongly ſuſpect that they have been hitherto confounded together, both by Hudſon and Lightfoot, under the name of P. *nanum*. It is undoubtedly a very diſtinct ſpecies from P. *aloides* of Hedwig, not only by its being larger in all its parts, and generally branched, but alſo by its leaves being ſerrated their whole length, and dentated on their back along the courſe of the middle nerve.

15. POLYTRICHUM *dentatum*, fol. lanceolatis acutis aculeato-dentatis, capſulis ſubcylindricis erectis. TAB. 7. FIG. 4.

Hab. in ora occidentali Americæ Septentrionalis.

It is from an inch to two inches high, and generally divided into three or four ſlender branches.—The *leaves* are ſtiff, lanceolate, acute, and ſtrongly dentated on the edges with ſharp whitiſh dents; their colour is a dark green when recent, but a reddiſh brown when dried; the middle nerve is elevated on the back of the leaf, and marked with a few dents near the tip.—The *peduncles* are generally two or three in number, of a dark reddiſh colour, and grow to an inch or an inch and half long: they ariſe from the ſummits of the branches out of cylindrical tubes which ſurround about two tenths of an inch of the baſe of each.—The *capſule* is ſomewhat cylindrical and erect; the rim is ſtrong and fringed with minute dents: the *operculum* is flat, with a ſmall point in the centre.—The exterior

calyptra

calyptra is of a ferruginous colour, and about twice the length of the inner one.

This is in Sir Joseph Banks's Herbarium, and was first brought from the north-west coast of America by Mr. Nelson, who accompanied Captain Cook in his last voyage. I have since frequently met with it myself in the pine-forests on the same coast; but it has not been found, to my knowledge, any where else.

16. POLYTRICHUM *urnigerum*; fol. lanceolatis acuminatis denticulato-serratis rigidis, capsulis cylindricis erectis.

P. *urnigerum Linn. Sp. Pl.* 1573. *Dill. Musc.* 427. *t.* 55. *f.* 5.
Habitat in ericetis montosis Angliæ, &c.

This grows from an inch to three inches in height; the lower part of the *stalk* is naked, but the upper part is crowded with leaves, and generally divided into numerous branches.—The *leaves* are lanceolate, sharp-pointed, rigid, and irregularly serrated with acute dents.—The *pedunctes* are about an inch or an inch and half long, and arise pretty copiously from the summits of the lower branches, and not from the *axillæ* of the leaves, as they have been generally described: the vaginal *perichætium*, which closely surrounds the base of each, is about an eighth of an inch in length.—The *capsule* is cylindrical and erect, having the rim wide, and fringed with minute dents. The *operculum* is flat, with a small point in the centre, and covers the rim with a thick obtuse edge.—The exterior *calyptra* is small and subulate, of a light ferruginous colour at the top, but whitish towards the bottom, and is rather more than twice the length of the inner one.

17. POLYTRICHUM *ſeptentrionale*, fol. lanceolatis acutis apice obſcurè ſerrulatis, capſulis ovatis erectiuſculis, operculo mucronato recurvato. TAB. 7. FIG. 5.

P. *ramoſum* Gunner. *Fl. Norveg.* 814. *Fl. Dan. tab.* 297.
P. *ſeptentrionale* Swartz *in Act. Stockh.* 1795. *p.* 270.
Hab. in alpibus Norvegicis.

This plant is about an inch and half in height, and from a ſmall naked *ſtem* ſuddenly divides into ſhort ſtiff crowded branches.—The *leaves* are ſhort, narrow, lanceolate, acute, and entire on the edges, except towards their tips, where, with the aſſiſtance of a magnifier, they may be perceived ſlightly ſerrulated: they are all nearly of the ſame ſize, and equally diſperſed round the branches.—The *pedúncles* are ſtiff, yellowiſh, about half an inch long, ariſing from the ſummits of the branches out of ſmall ſheathy tubes, which cloſely embrace their baſes.—The *capſule* is ovate and nearly erect: the *operculum* is conical, ending in a long recurved mucro.—The exterior *calyptra* is of a light ferruginous colour, and about twice the length of the inner one.

This is to be diſtinguiſhed from P. *alpinum* by being much ſmaller in all its parts,—by its leaves being ſhorter, more erect, and nearly entire on their edges,—by its capſules being moſtly erect, and its *operculum* ending in a long recurved mucro.

The ſhape of the capſule in the plate above quoted from the Flora Danica is not ſufficiently accurate, as it does not agree either with the plant or the deſcription of it inſerted in the ſame work. I have therefore given a new figure of it from a ſpecimen ſent me ſome years ago by Dr. Swartz of Stockholm, a learned and indefatigable member of this Society, to whom I am indebted for this, and many other intereſting communications.

18. Po-

18. POLYTRICHUM *alpinum*, fol. lineari-lanceolatis denticulato-ſerratis rigidis, capſulis ovatis ſubnutantibus.

P. *alpinum Linn. Sp. Pl.* 1573. *Dill. Muſc.* 427. *tab.* 55. *f.* 4.
Hab. in ericetis montoſis, in boreali parte Europæ.

The *ſtalk* of this is from two to three inches in height, and divides into numerous branches.—The *leaves* are ſtrong, ſtiff, linear-lanceolate, and finely ſerrated on the edges with ſharp minute dents: they are generally of a dark brown on the lower parts of the plant, but light green on the upper branches, where they alſo become brown in a dried ſtate.—The *peduncles* are numerous, from an inch to an inch and half long, of a deep ſtraw-colour, and iſſue from the ſummits of the branches out of cloſe cylindrical tubes, which are about two tenths of an inch in length.—The *capſule* is ovate, tumid, and a little inclined or nodding. The *operculum* is conical and pointed.—The exterior *calyptra* is ſmall, ſubulate, of a ferruginous colour, and about a third longer than the inner one.

19. POLYTRICHUM *ſylvaticum*, fol. lineari-lanceolatis acuminatis ſerratis rigidis, capſulis oblongis cernuis ſubincurvis. TAB. 7. FIG. 6.

Hab. in ſylvis abietinis oræ occidentalis Americæ ſeptentrionalis.

This grows from two to four inches and ſometimes even to ſix inches in height, and is looſely divided into four or five branches; the lower part of the *ſtalk* is ſtiff and naked, but the upper part and branches are crowded with long narrow ſpreading leaves.—The *leaves* are linear-lanceolate, ending with ſetaceous points, and finely ſerrated on the edges, which in a dried ſtate turn in ſo as to appear channelled; the lower leaves are of a reddiſh brown colour, but the upper ones are of a dark green.—The *peduncles* are from an

inch and half to two inches long, and arise from the summits of the branches out of sheathy tubes, which are about two eighths of an inch in length; they are shining, and of a deep straw-colour at their tops, but reddish towards their bases.—The *capsule* is oblong, a little inclined and somewhat incurved, and narrower towards the rim, where it is fringed with a regular row of minute whitish dents, to the number of about sixty-four. The *operculum* is flat, with a setaceous point issuing from the centre.—The exterior woolly *calyptra* is pointed, of a light ferruginous colour, and about a third part longer than the inner one, which is of the same colour, but darker.

In reference to TAB. VI and VII. it is to be observed, that adjoining to almost every figure, the exterior *calyptra* is laid open to show the inner one.—The tubular *perichætium* that surrounds the base of the peduncle is represented both in its natural size and enlarged.—A *leaf* of each is magnified to show its figure, and the *capsule* is exhibited either in its natural size or magnified, in order to give a more accurate idea of its shape.

VII. *Ob-*

Fig. 3.

Fig. 2.

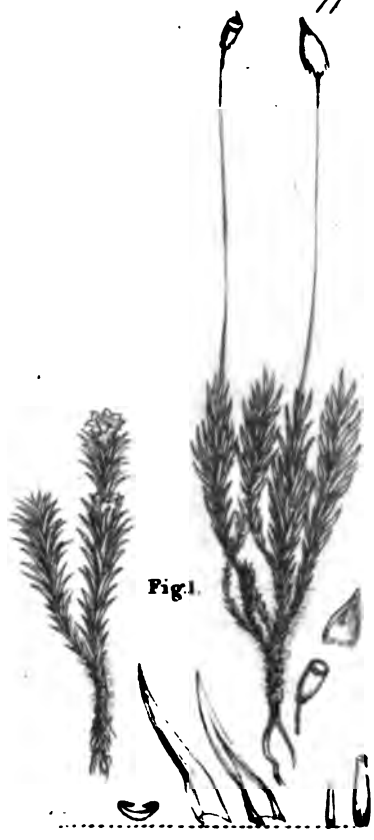
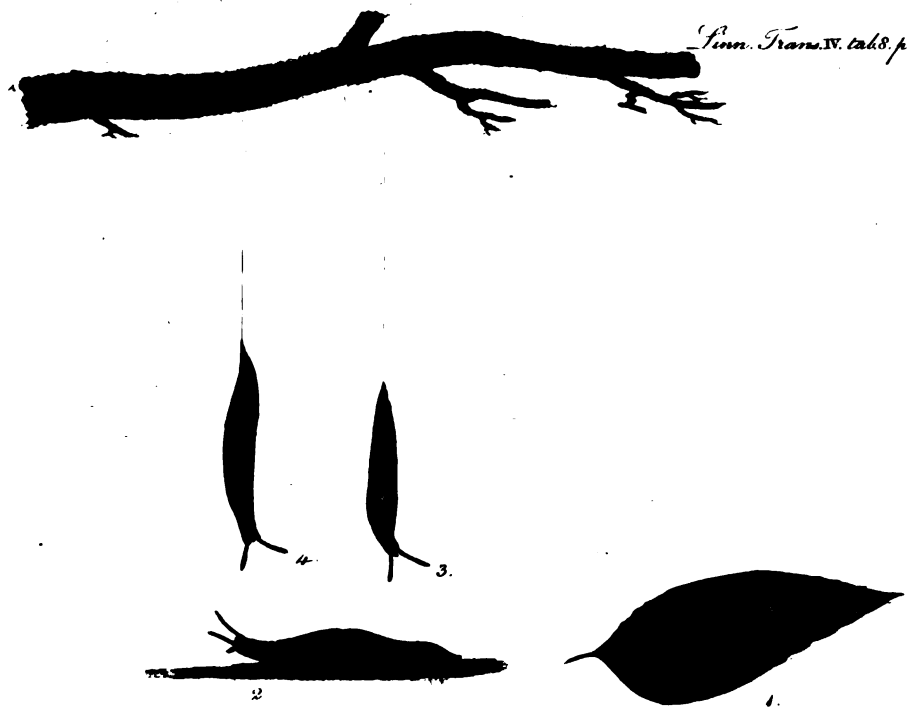


Fig. 1.

Fig. 6.

Fig. 5.

Fig. 4.



Spinning Limax.

Dipus canadensis.

VII. *Obſervations on the Spinning Limax. By John Latham, M. D. F. R. S. and L. S. Romſey.*

Read February 7, 1797.

THE account of the *Spinning Limax* ſeen and well deſcribed by Mr. Hoy, in the Firſt Volume of the Tranſactions of the *Linnean Society*, and obſerved ſome years prior thereto by Dr. Shaw, could not fail to ſtrike the notice of every Naturaliſt as a circumſtance unlooked for in this tribe of beings. Amongſt others my attentive and obſerving friend, and Fellow of this Society, Colonel Montagu, has been fortunate in reſiding this ſummer at Penryn in Cornwall, where this *Limax* or *ſlug* was in conſiderable plenty, by which means he has been enabled to draw up notes of many obſervations thereon, which he has communicated to me in various letters for the purpoſe of laying them before the Society.

The reſult of the Colonel's obſervations, omitting what Mr. Hoy has before ſaid on the ſubject, is nearly as follows:—The ſpecimens which he met with were in general from three-fourths of an inch to an inch in length, the general colour a greyiſh white, and the ſhield of a yelloviſh or buff-colour, as may be ſeen in the coloured drawing thereof. TAB. 8. *fig.* 1. ſhews the *ſlug* in a ſtate of repoſe on a leaf: *fig.* 2. that of progreſſive motion on the ground: *fig.* 3. a view of the upper ſurface whilſt ſuſpended by its thread from a branch: and *fig.* 4. the ſame ſeen from beneath. That it is a cuſtom not unuſual for this ſpecies of *Limax* to paſs

from an height ſecurely to the ground, by means of a thread of its own conſtruction, ſeems manifeſt; for, on my friend's putting one of them on the projecting frame of a window, it immediately crawled forwards till it came to the projecting angle, from whence, without attempting to fix itſelf by its fore parts to any thing, it became viſibly ſuſpended by a thread from its tail. When it had deſcended about two feet, the Colonel took it up by the thread, and carried it to a diſtant room; but, in trying to fix it afreſh, in order more accurately to obſerve its progreſs, the thread broke. He then put it on a frame about four feet from the ground; in a few minutes it was again ſuſpended, and, obſerving by his watch, deſcended at the rate of three inches and an half in a minute. The motion was not perfectly ſmooth and regular, but at times ſlight jerks were obſerved. When the ſlug was near the ground, an attempt was made, by taking hold of the thread near to the body, to fix it afreſh, but the thread again broke, as it did likewiſe on being tried three other times with the ſame view, each time the ſlug having nearly reached the floor. At laſt he fixed the end to a ſtick, by which he was enabled, by turning the ſtick round, to wind up the thread faſter than it was produced. The thread however ſoon broke, and after theſe trials, although the ſlug made ſeveral attempts to ſpin, it as often fell to the ground; on which it was put into wet moſs, and the next day ſeemed ſo far to have recovered the property of ſpinning, as again to go through the former experiments.

By the above repeated eſſays, the Colonel, by means of glaſſes, was enabled to make the fulleſt obſervations, and found for certain that the ſecretion, of which the thread was formed, was wholly from the under parts, and not from the back or ſides, both of which appeared nearly dry; nor did it proceed from any orifice in the tail, for in ſome experiments it was ſuſpended by the tip of the tail, at other times from full an eighth of an inch on one ſide of it. This

Limax appeared to be ſenſible of its abilities, for it extended itſelf from the bottom of the frame, with its head downwards, till the tail became ſuſpended; and it was by means of an undulating motion of the belly, ſimilar to that in the act of crawling, that the flow of the viſcous ſecretion was produced towards the tail; but in doing this the belly was extremely contracted, being furniſhed with numerous tranſverſe *rugæ*; at the ſame time the body and *tentacula* were fully extended, indicating no alarm whatever: the head was occaſionally moved from ſide to ſide, which gave ſeveral turns to the right or left as the centre of gravity lay; but as it as frequently turned one way as the other, the thread was not in the leaſt twiſted. The thread, on firſt leaving the tail, conformed to the ſhape of that part, being flat, and five times as broad as at one eighth of an inch diſtant therefrom; but afterwards ſeemed of an equal ſize, and conſiderably ſmaller than the fineſt human hair. When a portion of this thread was placed under a microſcope, it appeared contracted, by its ſurface being wrinkled; it was pellucid, and ſeemed elaſtic.

Colonel Montagu adds, that he has met with numbers of them, ſome of which could not by any means be induced to ſpin, as if ſenſible of their inability ſo to do, readily turning back when approaching the projecting edge; whilſt others at once let themſelves down without heſitation; ſo that it might be known by their motion, when near the brink of the precipice, whether they were endued with the faculty or not.

The above were the principal of the obſervations communicated to me, the laſt of which were made the beginning of October. My friend, as well as Mr. Hoy, ſeems to think that the ſubject in queſtion is no other than the *Limax agreſtis* of Linnæus, to which I moſt readily aſſent; and that it is moſt probably the variety mentioned by Müller in his *Hiſt. Verm. II. p.* 9. β. viz. *Limax albidus clypeo flaveſcente*; and perhaps alſo the var. ε. in Gmelin's edition of the *Syſt. Naturæ*

Naturæ of Linnæus, p. 3101. *Limax albus clypeo flaveſcente.* Liſter has figured it, not inaccurately, both in his *Animal. Angliæ*, *p.* 130. *tab.* 2, *f.* 16. as well as in his *Synopſis Method. Conch.* as one of his *Cochleæ nudæ terreſtres*, ſee *tab.* 101. A.: but both figures ſeem to correſpond with the plain ſort, in which the ſhield and body do not differ in colour; for he names it *L. cinereus parvus immaculatus.* However he is ſilent in reſpect to the faculty, in this identical ſpecies, of ſpinning a thread, although he has noticed the circumſtance in the *Limax cinereus* of Linnæus, which he names *L. cinereus maximus ſtriatus & maculatus*, *p.* 127. *t.* 2. *f.* 15. (the ſame figured in his *Synopſis*, *tab.* 101. a. f. d.) and delivers his ſentiments, at p. 130, in the following words: "Eoſdem Limaces alio tempore circa men-"ſem Junium in ſylvis opacis obſervavi, ex arborum ramis demiſ-"ſos, ſingulos ſingulis funibus bipedalibus craſſis & validis ſatis: ut "e propria ſaliva confectis. Eſt ſanè magna affinitas inter humo-"rem illum e quo araneorum erucarumque fila fiunt, atque horum "animalium ſalivam."

In reſpect to the quantity of glutinous matter ſufficient for the purpoſe of ſuſpenſion, according to Swammerdam the texture of the whole ſurface of the body is more or leſs diſpoſed to furniſh it *; but, by the above obſervations, we find that the glands of the belly and under parts are thoſe which are materially ſubſervient thereto.

* *Bibl. Naturæ, part* 1. *ord.* 1. *cap.* 6. where he ſays, "After what manner the ſlimy "humour diſtils from the glands of the ſkin, may be ſeen in this manner: The ſkin muſt "be wiped with ſpongy blotting paper until none of the ſlimy humour is ſeen, or till the "whole is cleared off; then the ſkin muſt be taken between the fingers and preſſed "gently; and if this be done under a microſcope, the ſlimy humour will be ſeen to come "out inſenſibly from the glandular pores of the ſkin like clear and minute points: theſe, "by continuing the preſſure, will become ſmall drops; and theſe, in ſome time, gather-"ing together, will form a conſiderable collection of this matter; ſo that the whole ſkin "will be moiſtened and become glutinous." See *Book of Nature, part* 1. *p.* 54. *(Engl. Tranſl.)*

From

From what has been ſaid it ſhould ſeem no difficult matter to ſuppoſe the poſſibility of *every Species of the Genus Limax* being competent to the forming threads of the like kind; ſo far from the faculty being confined to one in particular.

The firſt diſcovery of the ſingularity which has given riſe to the above eſſay, like many other things, was owing to fortuitous obſervation; and, to ſay the truth, the fact was totally unlooked for, and by many ſcarcely credited, although ſo well atteſted: but knowledge of every kind is ſlow in its progreſs. It is to be hoped, therefore, that no opportunity will be hereafter neglected by individuals of forwarding to the Linnean Society their obſervations without reſerve, although ſuch may appear at firſt trivial, for they may probably lead to more conſequential diſcoveries.

Ramſey, Nov. 11, 1796.

VIII. *An Eſſay on the Tracheæ or Windpipes of various Kinds of Birds. By John Latham, M. D. F. R. S. and L. S. Romſey.*

Read July 4, October 3, and November 7, 1797.

THE ſtudy of Birds has for many years paſt occupied my attention; and I might add, that from my earlieſt remembrance I have had a predilection in favour of this part of Natural Hiſtory, although my reſearches have not been totally confined thereto. I have hereby been tempted to publiſh my volumes of Ornithology, which, I flatter myſelf, are now generally known to the world.

During my progreſs in the deſcription of the external appearance of each, the criterion whereby moſt Ornithologiſts have thought it ſufficient to diſcriminate one ſpecies from another, I have alſo paid ſome attention to the ſtructure of the internal parts; and, among other things, the difference in the formation of the *trachea* in many of the Duck genus, in particular, has not failed to ſtrike my obſervation; and that this circumſtance will not a little contribute to aſſiſt our reſearches concerning the identity of ſeveral ſpecies, hitherto not a little confuſed, will hereafter be made to appear. But as I wiſhed to get as much light thrown on the ſubject as poſſible; I have poſtponed the publication of my obſervations, until by repeated diſſections, and comparing many individuals with one another, I might be enabled to ſpeak with the greater certainty. This matter has alſo required a much greater length of time in reſpect to the Duck genus, whoſe hiſtory will in this eſſay take up a material part of

of our attention, as it is only at particular ſeaſons that ſome of them are to be met with, and ſeveral in mild winters do not viſit this kingdom, except by ſeeming chance, or in very ſmall numbers. It is not poſſible therefore that any perſon of himſelf, however advantageouſly ſituated, can hope to meet with a ſufficient number of ſpecimens, without the aſſiſtance of others. I ſpeak this experimentally, as without ſuch aid I ſhould not have been able to have furniſhed matter for this eſſay.

Amongſt the various friends to whom I am obliged in reſpect to this undertaking, the judicious and well-informed Naturaliſt, William Boys, Eſq. of Deal, ſtands deſervedly foremoſt, having rendered me very great aſſiſtance, not only by ſpecimens, but by every obſervation in his power. I find myſelf greatly indebted to my friend Colonel Montagu, a moſt diligent obſerver of nature; alſo to Mr. Lamb, Surgeon, of Reading—all Fellows of this Society. Nor ſhould I omit my valuable correſpondent Dr. Bloch, of Berlin, who has rendered himſelf conſpicuous by ſeveral eſſays on the preſent ſubject, as may be ſeen in the Berlin Tranſactions*. To which muſt be added the obſervations of Doctors Pallas†, Beckmann‡, Silberſchlag§, and Otto‖, contained in the ſame works, all of which may be read to advantage; for although theſe gentlemen do not altogether coincide in their opinions, yet as they all tend to the ſame point, ſuch efforts in order to aſcertain truth muſt always be uſeful—Not forgetting due acknowledgment to the valuable paper of the late Dr. Parſons, who, many years prior to the above, gave an account of the ſtructure of the *aſperæ arteriæ*, or windpipes, of ſeveral Birds, and in the Land

* *Beſch. der Berl. Nat. Fr.* iv. p. 579.—*Schrift. der Berl. Nat. Fr.* i. p. 51.
† *Beſch. der Berl. Nat. Fr.* ii. p. 551.
‡ *Beſch. der Berl. Nat. Fr.* i. p. 170.
§ *Schrift. der Berl. Nat. Fr.* i. p. 36.
‖ *Beſch. der Berl. Nat. Fr.* iii. p. 456.

Tortoiſe, in the Philoſophical Tranſactions*. It is by means of the above reſources, added to the obſervations I have myſelf made for a number of years, that I ſhall endeavour to elucidate the ſubject as far as in my power; and although I may not be able to determine the matter with ſo great a degree of preciſion as might be wiſhed, it is more than probable that others, hereafter, will be able to complete the ſtructure of which I have endeavoured to lay the groundwork.

I ſhall begin this eſſay by obſerving, that in moſt birds the natural ſhape of the *trachea*, *aſpera arteria*, or *windpipe*, by all which names this part is known, is that of a regularly uniform cylinder of equal diameter, or nearly ſo, throughout, from its riſe at the root of the tongue, to its entrance into the hollow of the *thorax*, *ſternum*, or *breaſt-bone*, where it divides into two branches, called *bronchiæ*, which ramify into air-veſſels which compoſe the two lobes of the lungs. This, I ſay, is the general mode of conſtruction: but Ornithologiſts pretty far back† have noticed nature's deviation from this uſual ſtructure, both in reſpect to the various curvatures of the windpipe itſelf, as well as the difference of ſome from others in reſpect to conformation; but their ſentiments were penned in too vague a manner to determine much thereon, not anſwering the purpoſe further than to ſtimulate our future reſearches. As far as the deviation from a cylindrical ſhape is concerned, it is obſervable that the peculiar difference in ſtructure is ſeen only in the *male* ſex, the *female* not having the leaſt enlargement, or increaſed cavity, as will hereafter be mentioned: but to what purpoſe nature has intended this, is, I believe, at preſent unknown to us. Some authors have given as their opinion, that the enlargement of the *trachea* in males, whenever

* Vol. lvi. p. 204.

† Aldrovandus, Willughby.—See alſo Birch's Hiſt. Roy. Soc. ii. p. 13

it

it happens, ſerves to increaſe the tone of voice; and that this ſex is enabled, by means of it, to cry out more forcibly than thoſe birds which have no ſuch conſtruction of parts—an inſtance of which is pointed out in the *Golden-Eye Duck*, the Latin name of which *(Clangula)* has been given to it from this ſuppoſed circumſtance*. Others again have ſuppoſed that the peculiarity of ſtructure might be of uſe in diving; yet no one has authenticated to us, that the male is able to ſtay longer under water than the female. Concerning the want or preſence of an enlarged cavity, or labyrinth, as authors have called it, nothing can better ſuit our purpoſe than the examples of the *Scoter* and *Velvet Duck*, the latter of which has not only an enlargement of cavity at the bottom part, but likewiſe a large hollow in the middle, added to a third enlargement of hollow bone juſt below the *larynx*; but in the firſt-named not the leaſt deviation from an uniformly cylindrical ſhape is ſeen throughout the whole of its length, in either ſex:—yet, wonderful to ſay, the *Scoter* has by far the greater facility of the two, in reſpect to diving and ſtaying under the water, and on account of this property of diving becomes one of the moſt difficult birds to kill in its own element, as twenty ſhots have been made at one of theſe, by a good markſman, before one has taken effect. We cannot do amiſs alſo to remind the reader, that none of the genus of *Colymbus*, *Podiceps*, or *Uria*, which have acquired the name of *Divers* from being ſo often under water, do enjoy any material conſtruction of the *trachea* different from the *Cock* and *Hen*, which are well known to avoid the water from inſtinct. Neither can I learn that any thing occurs to outward appearance, that ſhould enable the *Corvorant*, *Shag*, and many others, to

* Geſner ſuppoſes the name to have been given from clapping the wings at the firſt riſing to take flight. "Ab alarum clangore, quæ firmiſſimæ ſunt, nec ſine ſono in volatu moventur." *De Nat. Av.* p. 104.

dive

dive with ſuch facility as they are known to do. The *Wild Swan*, in which we obſerve a great elongation added to a peculiar curvature of the windpipe, is able to hold its head for a length of time under water in ſearch of food; but we have no authority for ſaying whether it can do ſo a longer time than the *Tame Swan*, in which no ſuch peculiarity is ſeen. Beſides, the common *Crane*, and others of the *Ardea* genus, which have not in their power even to ſwim, are endowed with a much greater elongation and curvature of the windpipe than the *Wild Swan*. In reſpect to what aſſiſtance ſuch a conſtruction of parts as aboveſaid may afford to the tone of voice, I will not venture here to affirm; yet it cannot be denied that ſome birds are able to utter very loud ſounds without ſuch aid—witneſs the *Cock*, *Peacock*, and others*. We ſee Nature's operations and admire them in courſe, yet cannot always comprehend the utility of her works; and this ſeems one of her deſigns concerning which we are not at all clear. It, too, muſt be confeſſed, that the whole we have been able to obtain by our ſcrutiny into this ſubject is, the ſecurity of a mark of diſtinction, in reſpect to ſeveral ſpecies concerning which we have been more or leſs in a ſtate of uncertainty.

I am aware likewiſe that anatomiſts have done much in regard to the diſcovery of ſex, by obſerving the *teſticles* of the *male*, which conſiſt of two whitiſh glandular bodies placed juſt below the lungs, cloſe to the back-bone, and the *ovaries*, or cluſters of eggs, ſituated in the ſame place, in the *female*. It is true that the *ſex* may, by at-

* How far the diſcovery of the diſperſion of air-veſſels, which are found among the fleſhy parts of birds, pervading more or leſs even the *bones* themſelves, and communicating with the lungs, may contribute to their being able to dive and ſtay ſo long under water, or whether this circumſtance may aſſiſt in voice, ſong, or flight, is not for us here to determine. The matter is certainly worth further enquiry, but cannot make any part of this eſſay, further than to recommend the peruſal of a Treatiſe on the ſubject by our late friend Mr. John Hunter, in the Philoſophical Tranſactions.—See vol. lxiv. p. 205.

tending

tending to the above circumſtances, be moſt times got at the knowledge of; but we cannot thereby diſcriminate the *ſpecies*. And it is alſo more diſappointing, that, at ſome ſeaſons of the year, in particular ſubjects, theſe internal marks are ſo nearly obliterated as to deceive a very good comparative anatomiſt, and much leſs likely to be aſcertained by any one who may be but ſlightly verſed in ſuch matters. But the particular circumſtance of the *trachea*, as will hereafter be pointed out, never alters; except in being more or leſs complete in its period of oſſification during the life of the bird. I ought not however to omit, that in a very careful compariſon many traits of difference between one ſpecies and another may be detected by the ſkilful anatomiſt (although ſuch may not have either labyrinth, or any enlargement of the *trachea* to diſtinguiſh them by), ariſing from the ſtructure of the rings themſelves, aided by the muſcles appropriated to their motion; and it may be with confidence aſſerted, that one mean at leaſt, if not the principal, of producing a loud noiſe, and on the contrary, may ariſe from the peculiar conſtruction of theſe tracheal rings, which in many birds are found to be more or leſs complete in themſelves; ſome of them wanting even a large portion of the circle, whilſt others are not only perfect, but of a ſtrong and elaſtic ligamentous nature, and ſome few ſo greatly indurated as to approach almoſt to the texture of bone*.—Added to which is the great difference of muſcular appendages; for, in the birds which have a weak voice, the muſcles are ſo likewiſe: on the contrary, very ſtrong muſcles are obſervable in thoſe whoſe cry is loud, by which ſtructure the rings, the ſtrength of which is ever proportional, are put into violent action, and the bird thereby enabled to throw out the air with great force†. It is certain, alſo, that, in birds which

* As in the *Peacock*, *Gooſanders*, *Smew*, and ſome others.

† See a curious and elaborate diſſertation on this ſubject in *Magazin Encyclopédique*, tom. ii. p. 334 et ſeq.

ſing, the muſcles of the *larynx* are ſtouteſt in the *male*, and in the *Nightingale* are ſtronger in proportion than in any bird of the ſame ſize*. We have been imperceptibly led into the above diſcuſſion, although not originally meant to form any part of our plan, intending merely to illuſtrate ſuch variations of *tracheæ* as palpably differed from the uſual mode, either in reſpect to poſition or ſtructure.

The deviations in reſpect to the windpipe from what is generally ſeen, may be divided into two kinds.—The *firſt*, wherein this organ, although of equal diameter or nearly ſo, differs in being ſomewhat longer than the neck, and thereby allowing of a double about the middle of it, as in the *Wood Grous*—or, being further elongated, forming one or more folds either within the keel-like proceſs of the ſternum, which is hollowed out for that purpoſe, as may be ſeen in the *Wild Swan*, *Demoiſelle*, *Crane*, &c.—or, inſtead of entering the keel, runs more or leſs over the ſurface of the breaſt beneath the ſkin, as inſtanced in the *Marail*, *Barraka*, *Guan*, and others, as will be hereafter noticed.

The *ſecond* deviation is where the windpipe is unequal in diameter, although not elongated, but alters in ſhape and ſize, and in ſome birds very conſiderably, in its progreſs to the lungs, more eſpecially juſt before its divarication into the two *bronchiæ*, or lung-pipes.

This laſt circumſtance has been met with hitherto only in the *Duck* † and *Merganſer* genera, or at leaſt it is in theſe only that the *labyrinth* ‡, as it has been termed by authors, has been

* Mr. Barrington ſuppoſes that the Nightingale may be diſtinctly heard at more than half a mile, if the evening be calm. Phil. Tranſ. vol. lxiii. p. 279.

† I will not take upon me to ſay that other, and perhaps various kinds of, conformations of the *trachea* in the *Duck* genus may not hereafter be noticed; as we have good authority in reſpect to one ſpecies, where the windpipe runs on the ſurface of the breaſt in the manner of the *Guan*. See No. vi.

‡ Ampulla ſeu Labyrinthus, *Raii Syn. Av.* p. 135. *Will. Orn.* p. 253, et alibi. Labyrinth, *Will. Orn.* (Ed. Angl.) p. 335. *Ray's Letters*, p. 163.

found: and further, that it is the *male* alone which has this mark of diſcrimination; for although many birds may be found having the *female* plumage, in which the labyrinth is equally conſpicuous with others poſſeſſing that of the other ſex, yet I will venture to affirm, that this part differs not from that of an old male, except in reſpect to the oſſification being leſs complete; and again, that in every ſpecimen with ſuch enlargement of *trachea*, or labyrinth, the *teſtes*, an indubitable mark of the *male* ſex, will invariably be found to accompany it.

Among other errors, the *Glaucium* of authors, or *Morillon* of the French, has been recorded as a diſtinct ſpecies by many. This however may eaſily be proved a fallacy by diſſection, as the bird is no other than the *Golden Eye* in imperfect feather; for this ſpecies does not attain the adult plumage for at leaſt the firſt ſeaſon, perhaps longer. Another bird, paſſing under the name of *Morillon*, proves, by the ſame teſt, to be the young of the *Tufted Duck*; and a third called *Morillon* alſo, merely a young *Scaup*, which I have more than once identified. Beſides, were the difference of *bill* alone in theſe birds attended to, it could not fail to decide the matter, as they are greatly unlike each other in this particular, notwithſtanding the external colour of feather might lead a ſuperficial obſerver to think them the ſame.

The *wild Swan* is not greatly unlike the *tame* ſpecies in reſpect to plumage, the difference of bill at firſt ſight appearing to be the chief external characteriſtic, inſomuch as to deceive ſome Naturaliſts into the ſuppoſition of their being varieties only of one and the ſame ſpecies *; but

* *M. de Buffon* was appriſed of the difference of internal ſtructure, but accounts for it on a ſingular principle, when he obſerves in a note: "Selon Willughby cette particularité "de conformation eſt propre au cygne ſauvage, & ne ſe trouve point la même dans le cygne "domeſtique, ce que ſemble fonder ce que nous allons rapporter de la difference de leur "voix,

but under the eye of the Anatomiſt, who examines them internally, how widely do they differ!—In the *tame* one, little more occurs in reſpect to the windpipe than is to be ſeen in the common *Cock*, whilſt in the *wild Swan* it is lengthened greatly, and, entering a hollow in the keel of the ſternum, forms a doubling therein, before it returns to enter into the cavity and attach itſelf to the lungs, as will be hereafter ſhewn.

It ſeems unneceſſary to ſay more on this ſubject in a general way, as the circumſtances will occur in courſe under their particular heads: to avoid repetitions, therefore, I ſhall proceed to the deſcriptions themſelves; and, firſt, of thoſe birds in which the *trachea* or windpipe obtains a ſingularity, from its various inflexions in its paſſage to the lungs, without greatly deviating from the uniform and cylindrical ſhape, beginning with

I. TETRAO UROGALLUS.—WOOD GROUS. *Tab.* ix. *Fig.* 1.

T. fuſco-rufus, capite colloque cinereis, gulâ abdomineque nigris, axillis albis.

Tetrao Urogallus, *Linn. Syſt. Nat.* p. 273.—*Ind. Orn.* 2. p. 634.—*Friſch.* t. 107, 108.—*Raii Syn. Av.* p. 53. A. 1.—*Will. Orn.* t. 30.

Auerhahn, *Beſch. der Berl. Nat. Fr.* iv. p. 589. t. 18. f. 2.

Coq de Bruyere, *Buf. Oiſ.* ii. p. 191. t. 5.—*Pl. Enl.* 73, 74.

Wood Grous, Cock of the Wood, *Br. Zool.* i. t. 40, 41.—*Gen. Syn.* iv. p. 729.

In order to aſcertain the ſpecies here meant, it is right to obſerve, that the *Wood Grous* is well repreſented in the *Britiſh Zoology*, and

" voix, mais cela ne ſuffiroit peut-être pas pour prouver que leurs eſpèces ſoient differ-
" entes: cette diverſité n'excedant pas la ſomme des impreſſions tant interieurs qu'ex-
" terieurs, que la domeſticité & ſes habitudes peuvent produire à la longue ſur une race
" aſſujettée." *Hiſt. des Oiſ.* ix. p. 24. *(f).*

is

is alſo figured in the *Planches Enluminées*, as well as the Plate referred to in Friſch's work, where the reader may likewiſe learn the deſcription and manners.—He will, in like manner, be directed to the ſynonyms of ſuch authors as may be neceſſary for him to conſult, in reſpect to the other birds mentioned in this treatiſe, the deſign of which being chiefly that of deſcribing the organ of reſpiration called the *trachea* or windpipe; and as the *Wood Grous* ſeems to deviate from the common road, in a leſs degree than others which will be hereafter mentioned, it ſeems moſt proper to begin our ſubject with.

The windpipe in this ſpecies, otherwiſe than being longer than the neck, does not furniſh us with any thing material in reſpect to general conformation: it paſſes in a ſtraight direction downwards as far as the crop, where it takes a bend upwards, and again turning downwards, goes on to the lungs in the uſual way.

As the bird is very rare in this kingdom, I have never been able to examine more than one, which came from the North of Europe, and of which very little of the *trachea* remains with me, except the parts compoſing the bend: I have therefore availed myſelf of the drawing of Dr. Bloch in the *Berlin Tranſactions* above referred to, in order to perfect my figure, in which *a* repreſents the *tongue*—*bb* the *os hyoides*, or bone of the tongue, with its appendages—*c* the *larynx* with the *glottis* or orifice therein for the admiſſion of air—*dd* muſcles which accompany the *trachea*, one on each ſide, ſerving to lengthen or ſhorten it at the will of the bird—*f* the *tracheæ* or windpipe itſelf, forking off into two parts called *bronchiæ*, which divaricate into numberleſs ſmaller tubes, and loſe themſelves in the various ramifications of the lungs.

This general ſtructure of parts is greatly ſimilar in all birds, and will ſerve throughout this Eſſay whenever we may have occaſion to ſpeak of them, having in view ſuch readers as may not be con-

verſant in anatomy; to thoſe who are, it will be unneceſſary to ſay more, and to the uninformed I ſhould hope it may prove enough.

As far as I can learn, no particularity is obſervable in the windpipes of the three others of this genus which frequent this kingdom, viz. the *Black Cock*, *Red Grous*, and *Ptarmigan*. The two firſt I have myſelf examined; but in reſpect to the *Ptarmigan*, I have not as yet had an opportunity of ſeeing it in a recent ſtate; however, I am informed that nothing particular has been noticed in reſpect to the parts in queſtion.

II. PENELOPE MARAIL.—MARAIL TURKEY. *Tab.* IX. *Fig.* 2.

P. capite ſubcriſtato, temporibus gulâque incarnatis caruncu-latis.

Penelope Marail, *Gmel. Syſt. Nat.* i. p. 734.—*Ind. Orn.* 2. p. 620.

Faiſan verdâtre de Cayenne, Le Marail, *Buf. Oiſ.* ii. p. 390.—*Pl. Enl.* 338.

Marail Turkey, *Gen. Syn.* iv. p. 682.

This bird inhabits the woods of Cayenne and Guiana, where it is gregarious, and not unfrequently ſeen about houſes; it is likewiſe brought up tame, in the manner of our domeſtic poultry.

The *trachea* follows the courſe of the neck as far as the breaſt, where it riſes on the outſide of the fleſh, being covered only by the ſkin and feathers, and paſſes downwards ſome way; after which it returns upwards, and, bending over the right clavicle or collar-bone, divides into the two uſual portions, entering the cavity, and joins the lungs: at the part where it makes the curve on the breaſt, it is kept in its place by a ſtrong muſcle, which is perceivable quite to the breaſt-bone. The above is obſerved in both ſexes. The general cry is ſaid to be not inharmonious; except when irritated or wounded, when it is harſh and loud.

III. PHASIANUS PARRAKA—PARRAKA PHEASANT. *Tab.* ix. *Fig.* 3.

Ph. ſubcriſtatus fuſcus ſubtus fulvus, caudâ elongatâ apice integrâ.

Phaſianus Parraka, *Gmel. Syſt. Nat.* i. p. 740.—*Ind. Orn.* ii. p. 632.

Le Parraka, *Buf. Oiſ.* ii. p. 394.—*Mem. ſur Cayen.* i. p. 378.—*Pl. Enl.* 1. 2.

Parraka Pheaſant, *Gen. Syn.* iv. p. 722.

This bird is common in the woods of Guiana, and differs from the former in having the *trachea* of a much greater length, deſcending on the breaſt more than half way before it makes a turn upwards; after which it paſſes over the right clavicle, into the cavity of the breaſt. It may be obſerved, that in both theſe birds the deſcent is on the left ſide, and the aſcent on the right. The *Parraka*, however, differs from the *Marail*; for the *male* only has the elongation of the *trachea*; in the *female* it paſſes immediately to the breaſt without the leaſt ſingularity. This bird is ſaid to ſet up a very loud cry at ſun-ſet, which is thought to be the loudeſt of all birds in the new world, and to greatly reſemble the word *Parraka* repeated many times together, from which it has obtained the name.

IV. PENELOPE CRISTATA—The GUAN. *Tab.* x. *Fig.* 1.

P. capite pennis erectis criſtato, temporibus violaceis.

Penelope criſtata, *Gmel. Syſt. Nat.* i. p. 733.—*Ind. Orn.* ii. p. 619.

Meleagris criſtata, *Linn. Syſt. Nat.* i. p. 269.

Jacupema *Raii Syn. Av.* p. 56. 2.—*Will. Orn.* p. 165. t. 28. *Merrem. Ic. Av.* ii. p. 42. t. 4.

Guan or Quan, *Edw. Pl.* 13.—*Gen. Syn.* iv. p. 680. 3.

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The *Guan* frequents the ſame places as the two laſt birds, and like them is frequently domeſticated: but in the ſingularity of the windpipe, it far exceeds them; for it not only deſcends much lower on the breaſt, but at the bottom part it doubles upwards for at leaſt one third of its length:—it differs alſo in another particular; for, inſtead of making a deſcent on the left ſide, it paſſes down on the right, and, contrary to the others, returns upwards, and goes into the cavity of the thorax over the left clavicle.—I owe the drawing of the figure, from which my repreſentation of it is copied, to the kindneſs of my late friend Sir Aſhton Lever, who was induced, from its great peculiarity, to have the parts ſketched as they appeared in the recent ſtate.

V. CRAX PAUXI—CUSHEW CURASSOW. *Tab.* xi. *Fig.* 1 & 2.

Cr. cerâ cœruleâ, narium gibbere criſtato, corpore nigricante, abdomine apiceque caudæ albis.

Crax Pauxi, *Linn. Syſt. Nat.* i. p. 270.—*Ind. Orn.* 2. p. 624.—*Briſſ. Orn.* i. p. 302.

Hocco de Mexique, Le Pierre, *Buf. Oiſ.* ii. p. 348.—*Pl. Enl.* 78.—*Mem. de l'Acad. des Scien.* 1781. p. 376. pl. viii.

Cuſhew Curaſſow, *Edw. Pl.* 295. *f.* 2.—*Lath. Syn.* iv. p. 696.

The *trachea* in this ſpecies does not greatly differ from thoſe of the *Parraka* and *Guan*, but appears to be the largeſt, in proportion to the bird, of any yet obſerved:—it extends on the outſide of the breaſt under the ſkin in a ſimilar manner, and firſt paſſes downward over the right pectoral muſcle, going on ſtraight quite to the end of the ſternum, at which place it makes a convolution to the left for three inches in length, and ſomewhat in the ſhape of a ring; after which it returns again over the right pectoral muſcle, and turns over the clavicle into the thorax.

The

The above account is extracted from a Diſſertation on this bird, in the Memoirs of the Academy of Sciences; but no anatomical figures accompany it, although a good repreſentation of the bird itſelf is given at the end of the Eſſay. This circumſtance, however, is the leſs to be regretted, as I have been favoured with the two views annexed, from the rich and elegant Muſeum of John Heaviſide, Eſq. of Great George Street, who, amongſt many curious anatomical ſubjects, poſſeſſes a preparation of the parts in very fine condition.

VI. ANAS SEMIPALMATA—SEMIPALMATED GOOSE.

A. griſea, capite collo femoribuſque nigris, collari uropygio corporeque ſubtus albis, pedibus ſemipalmatis.
Habitat in Novâ Hollandiâ.

This ſeems to be a ſpecies not hitherto deſcribed; it is nearly of the ſize of the *wild Gooſe:* the bill is brown, and the cere paſſes on each ſide to the eyes; the head, neck and thighs are black; a collar of white encircles the lower part of the neck, and the rump and under-parts are alſo white; the legs are red, and the toes only webbed half-way from the baſe.

This is met with near Hawkſbury river, in New South Wales, in flocks, and is there called *New South Wales Gooſe.* It is peculiar in that the windpipe forms ſeveral beautiful circumvolutions on the breaſt, under the ſkin, before it enters the thorax: its note is ſaid to be tuneful and melodious; and it was obſerved ſometimes to perch on trees, in the manner of the *Whiſtling Duck.*

I was favoured with a ſight of a drawing of the bird, added to the above account of its manners, at A. B. Lambert's, Eſq. Lower Groſvenor Street.

VII. CRAX

VII. CRAX ALECTOR—CRESTED CURASSOW. *Tab.* X. *Fig.* 2. 3.

Cr. cerâ flavâ, corpore nigro, ventre albo.
Crax Alector *Linn. Syſt. Nat.* i. p. 269.—*Ind. Orn.* 2. p. 622.—*Briſſ. Orn.* i. p. 298. t. 19.
Mituporanga, *Raii Syn.* p. 56. 6.—*Will. Orn.* p. 115. t. 28.
Hocco de la Guiane, *Buf. Oiſ.* ii. p. 375. pl. 13.
Indian Cock, *Pitf. Mem.* t. p. 190.—*Phil. Tranſ.* lvi. p. 215. t. 10. fig. 3.
Creſted Curaſſow, *Gen. Syn.* iv. p. 690.

This likewiſe is a bird of ſome peculiarity in reſpect to the *trachea*, which is pretty ſtout, and the rings in proportion: it paſſes in a ſtraight direction to the bottom of the neck, at which part it loſes its round form, and becomes ſomewhat broad and flat; it then turns backwards and upwards for more than an inch, when it doubles again forwards and downwards; after which it enters the cavity of the breaſt, and is diſtributed by its two portions into the lungs.—This circumſtance takes place at the front of the keel of the ſternum or breaſt-bone, but does not enter into the keel itſelf, as in the three following ſpecies.

In the Philoſophical Tranſactions above quoted is a figure of the ſubject given by Dr. Parſons; it is alſo repreſented in the Plate referred to in Pitfield's tranſlation of *Memoires pour ſervir à l'Hiſtoire des Animaux*. The firſt of theſe I have thought right to copy (fig. 2.) and I have added alſo the figure of one which belonged to a bird in my own collection (fig. 3.), from which it differs not a little:—but I find that this part of the *trachea* is apt to vary in different ſpecimens; for a ſecond figure, engraved in the ſame Plate of Pitfield, ſhews the bend to be very ſmall, appearing like a mere twiſt only; from which circum-

circumſtance, we may conclude that other varieties may be occaſionally met with.

Whether the *female* has ſuch a conformation of parts is not in my power to determine; but it may be obſerved, that the two birds diſſected by the Academy of Sciences, as well as my own, were *males.*

VIII. ARDEA VIRGO—DEMOISELLE HERON. *Tab.* x. *Fig.* 4.

A. ſuperciliis albis poſticè retrorſumque criſtatis.
Ardea Virgo, *Linn. Syſt. Nat.* i. p. 234.—*Ind. Orn.* 2. p. 673.
La Grue de Numidie, *Buf. Oiſ.* vii. p. 313. pl. 15.—*Pl. Enl.* 241.
Demoiſelle or Numidian Crane, *Gen. Syn.* v. p. 35.—*Edw. Pl.* 134.
Pitſ. Mem. t. p. 204.—*Phil. Tranſ.* lvi. p. 210. t. xi. f. 5.

This beautiful and elegant bird is well known in our menageries, and is frequently ſo tame as to mix with the poultry, though in the winter ſeaſon it requires defence from cold. In it the *trachea* enters a cavity in the keel of the ſternum for about three inches, when it returns after making a bend as in the two following ſpecies, and paſſes into the cheſt. I had, many years ſince, an opportunity of obſerving this circumſtance in a ſpecimen of my own; but, from the great length of time, the part had ſo far periſhed as to render it impoſſible to take a drawing from it. I am therefore conſtrained to copy the figure in the Philoſophical Tranſactions, which I have not the leaſt doubt of being ſufficiently authentic.

IX. ANAS CYGNUS—WILD SWAN. *Tab.* xii. *Fig.* 1. 2.

A. roſtro ſemicylindrico atro, cerâ flavâ, corpore albo.
Anas Cygnus, *Linn. Syſt. Nat.* i. p. 194.—*Ind. Orn.* 2. p. 833.—*Brif. Orn.* vi. p. 292. t. 28.—*Raii Syn. Av.* p. 136. A. 2.

Cygne ſauvage, *Buf. Oiſ.* ix. p. 3.
Der Singchwan, *Beckſt. Vog. Deutſch.* ii. p. 581.
Wild or Whiſtling Swan, *Gen. Syn.* vi. p. 433.—*Br. Zool.* ii. No. 264.—*Edw.* t. 150.—*Phil. Tranſ.* lvi. pl. x. p. 215. f. 1. 2.

The *Wild Swan* is a bird much leſs known than the *tame* ſpecies, which is every where domeſticated, for it only viſits this kingdom in very ſevere ſeaſons;—it differs from the laſt, firſtly, in the bill, which may be ſeen by compariſon; and ſecondly, in ſize, being ſmaller. The plumage likewiſe is by no means of that dazzling ſnowy whiteneſs which characteriſes the tame ſpecies; but the eſſential and ſpecific mark of diſtinction is that of the *trachea*, in which, as well as in the conformation of the breaſt-bone itſelf, it is ſo particularly different as to prove at once that there can be no relation whatever between the two.

The windpipe in the *Wild Swan*, meant in this place to be treated of, paſſes down the neck the whole of its length, after which it enters the keel of the ſternum, paſſing backwards therein nearly the whole of its length, when it bends upwards and forwards, and then enters the cavity of the breaſt, to communicate with the lungs. It is not neceſſary to mention further particulars, as the figure of the breaſt-bone and *trachea* in ſitu will ſufficiently point out the circumſtance; nor is it neceſſary to ſay more in this place, than that the above ſtructure of parts is obſervable in both ſexes indiſcriminately.

To obviate every poſſibility of miſtake between the two ſpecies, I have thought right to exhibit a front view of the breaſt-bone of both, in which a large cavity may be ſeen in that of the wild ſpecies, ſufficient to admit of the entrance and exit of the *trachea*, as well as its doubling therein; whilſt in that of the tame Swan (Tab. xii. fig. 3.) no other ſtructure is obſervable than in the common gooſe.

X. ARDEA

X. ARDEA GRUS—The CRANE. *Tab.* xii. *Fig.* 4.

A. occipite nudo papilloſo, pileo remigibuſque nigris, corpore cinereo, tectricibus intimis laceris.

Ardea Grus, *Linn. Syſt. Nat.* i. p. 234.—*Ind. Orn.* 2. p. 624.—*Raii Syn. Av.* p. 95. A. 1.—*Will. Orn.* p. 294. t. 48.

La Grue, *Buf. Oiſ.* vii. p. 287. fol. 14.—*Pl. Enl.* 769.

Der Kranich, *Beſch. der Berl. Nat. Fr.* iv. p. 586. t. xvi.

The Crane, *Gen. Syn.* v. p. 50.—*Br. Zool.* ii. App. p. 629. pl. 6.—*Phil. Tranſ.* lvi. p. 208. t. 11. f. 4.

In this bird the *trachea* enters the keel of the ſternum in like manner as in the *Wild Swan*; with this difference, that it is doubly reflected*, as may be ſeen by conſulting the figure. As in the *Wild Swan*, ſo in the *Crane*, we find that both ſexes have the ſame conformation of parts, excepting that, in reſpect to the *Crane*, the *trachea* in the female does not paſs near ſo far into the keel of it as in the male, nor is the doubling nearly ſo conſiderable.

WE now paſs to birds in which the *trachea* enlarges in various parts, eſpecially juſt at the angle of divarication, where it goes to the lungs; and which laſt circumſtance, for want of a better name, authors have agreed to call by the name of *Ampulla*, or *Labyrinth*, as before obſerved, p. 96.

* To uſe the expreſſion of Dr. Parſons, "This may be compared to a French-horn, "whereas that of the Wild Swan is ſtraight within the bone, and may be compared to a "Trumpet; yet the entrance of this into the ſternum and its exit, and its paſſage into the "cavity of the thorax, are ſimilar to thoſe of the Wild Swan." See *Phil. Tranſ.* l. c.

XI. ANAS CRECCA—The TEAL. *Tab.* xiii. *Fig.* 1.

A. ſpeculo alarum viridi, linea alba ſupra infraque oculos.

Anas Crecca, *Linn. Syſt. Nat.* i. p. 204.—*Ind. Orn.* 2. p. 872.—*Raii Syn. Av.* p. 147. A. 6.

Petite Sarcelle, *Buf. Oiſ.* ix. p. 265. pl. 17. 18.—*Pl. Enl.* 947.

Krikente, *Beſch. der Berl. Nat. Fr.* iv. p. 600. t. 18. f. 6.

Common Teal, *Gen. Syn.* vi. p. 551.—*Br. Zool.* ii. No. 290.—*Will. Orn.* p. 377. t. 74.

The Teal is a well known bird, and perhaps the ſmalleſt of the Duck kind. The labyrinth is in proportion to the ſize, as big as a large pea on one ſide, and ſpreading on the oppoſite part into a kind of convex ſhape, at the bottom of which the *bronchiæ* or lung-pipes are attached,—The *female* has no labyrinth.

XII. ANAS QUERQUEDULA—The GARGANEY. *Tab.* xiii. *Fig.* 2. 3.

A. macula alarum viridi, linea alba ſupra oculos.

Anas Querquedula, *Linn. Syſt. Nat.* i. p. 204.—*Ind. Orn.* 2. p. 872. *Raii Syn. Av.* p. 148. 8.

Sarcelle, *Buf. Oiſ.* ix. p. 260.—*Pl. Enl.* 946.

Winterholbente, *Beſch. der Berl. Nat. Fr.* iv. p. 600. t. 18. f. 4?

Garganey, *Gen. Syn.* vi. p. 550.—*Br. Zool.* ii. No. 289. pl. 101.—*Will. Orn.* p. 377. pl. 74.

This bird meaſures, from bill to tail, ſeventeen inches, being three inches longer than the *Teal.* The labyrinth is larger, and differs conſiderably in ſhape, being nearly oval, and placed perpendicularly, ſo as to appear rather as a continuation of the *trachea*, than an appendage to it, as in ſeveral other ſpecies. It is externally a trifle indented on one ſide, in which furrow a muſcle * paſſes, making it ap-

* Two muſcles, one on each ſide, are ſeen in all freſh ſpecimens; but, when dry, theſe are many times ſcarcely to be detected.

pear

pear as divided into two unequal portions; on the oppoſite part, or that ſituated next the breaſt, it is flattened, and from the upper part of it the two *bronchiæ* have their origin.

I have ſome reaſon for affirming, that authors have unneceſſarily divided the Teals into more ſpecies than really exiſt; for the *Teal* ſo called, and the *Summer Teal*, certainly conſtitute but one; and although *males* have been met with of the latter, it is probable that the external diſtinction of feather may not be fixed till the ſecond year, or even beyond that period: it is not enough that the *teſtes* are viſible; for, as above mentioned, that circumſtance of itſelf can only prove the *ſex*: it is to the labyrinth alone that we muſt have recourſe in all birds which poſſeſs it; for this remains nearly the ſame during life. I ſcarcely need here obſerve, that the *male* alone poſſeſſes the labyrinth, not only in this, but alſo in every other ſpecies of Duck hitherto examined.

XIII. ANAS CLYPEATA—The SHOVELER. *Tab.* xiii. *Fig.* 4. 5.

A. roſtri extremo dilatato rotundato, ungue incurvo.

Anas clypeata, *Linn. Syſt. Nat.* i. p. 200.—*Ind. Orn.* ii. p. 856.—*Raii Syn.* p. 144. A. 9. *et* 13.—*Briſ. Orn.* vi. p. 329. t. 32. f. 1.

Le Souchet, *Buf. Oiſ.* ix. p. 191.—*Pl. Enl.* 971. 972.

Die Löffelente, *Schr. der Berl. Nat. Fr.* iii. p. 373. t. 7. f. 2.

Shoveler, *Gen. Syn.* vi. p. 509.—*Br. Zool.* ii. No. 280.

This bird is about two inches longer than the laſt, and is far from being uncommon. The end of the *trachea* is furniſhed with a labyrinth, which is ſmall in proportion to the ſize of the bird, being ſcarcely more than half the ſize of that of the *Garganey*. It is of nearly equal dimenſions throughout, except near the bottom, where it ſlightly enlarges; on the left ſide is a kind of bony bladder a little irregular in ſhape, about the ſize of a large rounceval pea, with two or three ſlight indentations on the ſides;—from this ſprings

one

one of the *bronchiæ*; the other ariſes from a kind of bony arch, with which the *trachea* ends, and which is a triſle above the level of the top of the labyrinth.

XIV. ANAS ACUTA—The PINTAIL DUCK. *Tab.* xiii. *Fig.* 6.

A. cauda acuminata elongata ſubtus nigra, occipite utrinque linea alba, dorſo cinereo undulato.

Anas acuta, *Linn. Syſt. Nat.* i. p. 201.—*Ind. Orn.* 2. p. 864.—*Raii Syn. Av.* p. 147. A. 5.—*Briſ. Orn.* vi. t. 34. f. 1. 2.

Canard à longue queue, *Buf. Oiſ.* ix. p. 199. t. 13.—*Pl. Enl.* 954.

Pfeilſchwanz, *Beſch. der Berl. Nat. Fr.* iv. p. 601. t. 18. f. 5.

Pintail, *Gen. Syn.* vi. p. 526.—*Br. Zool.* ii. No. 282.—*Will. Orn.* p. 376. t. 73.

This ſpecies meaſures twenty-eight inches in length, and is common in our markets in the winter ſeaſon. The *trachea* finiſhes in a bony arch like the former, from which one of the branches of divarication ſprings: attached to the ſide of this is a nearly round bony bladder, delicate in texture, and about the ſize of the end of the thumb; the upper ſurface of it about even with the top of the bony arch, but the bottom greatly below it: from which circumſtance it is, independent of ſize, particularly diſtinguiſhed from the ſame part in the *Wigeon*, though at firſt ſight appearing ſomewhat ſimilar. It may not be amiſs here to obſerve, that, in young birds, this roundiſh bladder will ſuffer itſelf to be indented by preſſure, but at mature age becomes very brittle, ſo as not to be handled without ſome care; from the under and inner part of this, the ſecond diviſion of the *trachea* takes riſe. The oppoſite ſide is formed not greatly different, but puts on the appearance of an oval obliquely placed, in the ſame manner as in the oppoſite ſide of the *Gadwal*, or next ſpecies.

XV. ANAS STREPERA—The GADWAL. *Tab.* xiii. *Fig.* 7. 8.

A. ſpeculo alarum rufo nigro albo.

Anas ſtrepera, *Linn. Syſt. Nat.* i. p. 200.—*Ind. Orn.* ii. p. 859.—*Raii Syn. Av.* p. 145. A. 2.—*Briſ. Orn.* vi. p. 339. t. 33. f. 1.

Chipeau, *Buf. Oiſ.* ix. p. 187. t. 12.—*Pl. Enl.* 958.

Gadwal or Grey, *Gen. Syn.* vi. p. 515.—*Br. Zool.* ii. No. 288.—*Will. Orn.* p. 374. t. 72.

This ſpecies is about 15 inches long, but is much leſs common than the former. The windpipe is long, and furniſhed with a bony bladder and arch as in the laſt ſpecies, but differs in ſhape, and the globular part is not near ſo large; it is likewiſe elongated upwards and downwards in an oblique direction, and is a little compreſſed on the ſides: it is alſo diſtinguiſhed from the *Pintail* in another particular, which is, that the bony orb in that ſpecies adheres to the ſide of the arch by a ſmall portion only, whereas in the *Gadwal* it is firmly fixed to it at the bottom; that portion of it which lies next to the *trachea* is flat, and in the recent ſtate joined thereto cloſely by a membrane. The bony arch too is full half an inch in height, differing in this particular from that of the *Pintail*, which is ſcarcely three-eighths of an inch; and this proportion of parts holds good in every ſpecimen which has come under my inſpection.

XVI. ANAS PENELOPE—The WIGEON. *Tab.* xiii. *Fig.* 9.

A. cauda acutiuſcula criſſo nigro, capite brunneo, fronte alba, dorſo cinereo undulato.

Anas Penelope, *Linn. Syſt. Nat.* i. p. 202.—*Ind. Orn.* ii. p. 860.—*Raii Syn. Av.* p. 146. A. 3.—*Briſ. Orn.* vi. t. 35. f. 2.

Canard ſiffleur, *Buf. Oiſ.* ix. p. 169. t. 10, 11.—*Pl. Enl.* 825.

Pfeifente,

Pfeifente, *Beſch. der Berl. Nat. Fr.* iv. p. 601. t. 18. f. 5.
Wigeon, Whewer, Whim, *Gen. Syn.* vi. p. 518.—*Br. Zool.* ii. No. 286.—*Will. Orn.* p. 375. t. 72.

The total length is 20 inches. The *trachea* at firſt ſight does not ſeem materially to differ from that of the *Pintail*, yet on a more narrow inſpection will be found not to accord with it. In the firſt place the bony orb is ſmaller, not being larger than the end of the finger—both indeed ſeem globular, but that of the *Wigeon* is moſt perfectly ſo. They both differ likewiſe in point of attachment. In the *Pintail* it is united to the ſide of the arch on a line above the centre, in the *Wigeon* ſomewhat below it, and the bottom of both the orb and arch are nearly even, but in the *Pintail* the bottom of the arch is higher of the two—beſides which, the bony arch itſelf is a little different in ſhape, as may be ſeen by comparing the two figures. The oppoſite parts of both put on an appearance not greatly different from thoſe of the *Gadwal*, which makes it unneceſſary to give a figure of them in that ſituation.

From the above compariſon, it is preſumed that no one will hereafter confound the laſt three birds together.

XVII. ANAS BOSCHAS—The MALLARD. *Tab.* xiii. *Fig.* 10.

A. rectricibus intermediis (maris) recurvatis, roſtro recto.
Anas Boſchas, *Linn. Syſt. Nat.* i. p. 204.—*Ind. Orn.* ii. p. 850.—*Raii Syn. Av.* p. 145. A. 1. 150. 1.
Canard ſauvage, *Buf. Oiſ.* ix. p. 115. t. 7. 8.—*Pl. Enl.* 776. 777.
Die zahme und die wilde Ente, *Beſch. der Berl. Nat. Fr.* iv. p. 601. t. 18. f. 5.
Mallard and Wild Duck, *Gen. Syn.* vi. p. 489.—*Br. Zool.* ii. No. 279. t. 97.—*Will. Orn.* p. 308. t. 72. 75.

This

This ſpecies is larger than any of the *Duck* genus before mentioned, except the *Swan* and *Semipalmated Gooſe*, and the *trachea* is ſtouter in proportion. The globular part is a trifle bigger than in the *Pintail*, but loſes its round ſhape in ſome meaſure at the lower portion of it: it is likewiſe much leſs ſmooth on the ſurface, being ſomewhat furrowed, and marked with minute wrinkled lines. The bony arch is much deeper than in any of the foregoing, is attached to the globular part almoſt the whole of its length, and in ſome ſpecimens meaſures full three-fourths of an inch. The whole of this part likewiſe is ſtronger than in any ſpecies before deſcribed. The labyrinthic or globular part of the *trachea* indeed varies a little in reſpect to ſize, both in the wild and tame ſorts, but is in general larger in the domeſticated ones. Much controverſy has been held concerning the *Curved-billed Duck*; ſome ſuppoſing it to be a variety only of the *Mallard*, and others wiſhing to make it a diſtinct ſpecies. This bird has not come under our view anatomically, having only met with it in menageries, or preſerved in collections; but it is to be wiſhed that a ſtrict compariſon may be made in reſpect to the *trachea*, by means of which I have not a doubt of the different opinions being at once ſettled.

XVIII. ANAS MOSCHATA—MUSCOVY DUCK. *Tab.* xiv. *Fig.* 1, 2. *Tab.* xvi. *Fig.* 5, 6.

A. facie nuda papilloſa.

Anas moſchata, *Linn. Syſt. Nat.* i. p. 199.—*Ind. Orn.* ii. p. 846.—*Raii Syn. Av.* p. 148.—*Friſch.* t. 180.

Le Canard muſqué, *Buf. Oiſ.* ix. p. 162. pl. 9.—*Pl. Enl.* 989.

Die Turkiſche Ente, *Schr. der Berl. Nat. Fr.* iii. p. 372. t. 7. f. 1.

Muſcovy Duck, *Gen. Syn.* vi. p. 476.—*Will. Orn.* p. 381, 382.

The *trachea* in this bird is ſtout, and nearly of equal diameter, but

a trifle ſmaller towards the bottom: the bony arch, as in others, finiſhes the bottom part, and ſeems as if furniſhed with rings, but they are not moveable as in the reſt of the *trachea*. The orbicular labyrinth is attached to the ſide of it; this is not ſmooth on the ſurface as in the *Pintail* and *Wigeon*, but univerſally rough, and irregularly furrowed with fine indented lines. The oppoſite ſide runs into a pear ſhape, and is placed obliquely, with the pointed end loweſt, as in the two laſt named birds, but is flatted conſiderably on the ſurface. The bony arch on this ſide is ſmooth, having no appearance of rings, and is bent at a ſmall angle from the *trachea*, although it conſtitutes a continuance of it: this is the deſcription of the organ in a young bird.

In a ſpecimen ſomewhat more advanced in age, with which I was favoured by Mr. Lamb of Reading, the bony labyrinth approaches more to a rounded ſhape, and is larger, but ſtill retains the rough ſurface, and the appearance of bony rings on the arch ſeems leſs diſtinct;—and in an old bird, the drawing of which I was favoured with by Mr. Boys, the labyrinth is not only much larger in ſize, but is nearly globular, and the bony arch quite ſmooth: yet Mr. Boys obſerves, that the labyrinthic part is finely gramulated and faintly wrinkled, and the texture firm and bony; but in this laſt circumſtance it does not differ from the younger ones. As to that figured by Dr. Bloch, in the *Berlin Tranſactions*, it ſeems at firſt ſight too large by many degrees; yet I will not venture to ſay that his figure of it is faulty, for in caſe the *Muſcovy Ducks* ever arrive at twice the ſize we uſually ſee them in England, which they are ſaid to do in warm climates, no doubt but the labyrinth will bear its due proportion.

XIX. ANAS

XIX. ANAS MARILA—SCAUP DUCK. *Tab.* xiv. *Fig.* 3, 4.

A. nigra, humeris cinereo-undulatis, abdomine ſpeculoque alari albis.

Anas Marila, *Linn. Syſt. Nat.* i. p. 196.—*Ind. Orn.* ii. p. 853.—*Raii Syn.* p. 142. A. 6.

Die Bergente, *Beſch. der Berl. Nat. Fr.* iv. p. 602. t. 17. f. 3, 4.

Scaup Duck, *Gen. Syn.* vi. p. 500.—*Br. Zool.* ii. No. 275. pl. 100.—*Will. Orn.* p. 365.

The breadth of the *trachea* of this ſpecies, in the middle, is full half an inch; it leſſens a trifle towards the top, but diminiſhes very conſiderably as it approaches the bottom, ſo as not to meaſure more than three lines where it joins the labyrinthic part; the total length is from $7\frac{1}{2}$ to 8 inches. We find the name of *labyrinth* generally given to this portion of the *windpipe* of the foregoing Ducks; and we continue the appellation, although the correſponding part in many may be more aptly compared to a *drum*, and in courſe the word *tympanum* might be ſubſtituted for that of *ampulla;* as this part, inſtead of being globular, preſents a more or leſs flatted ſurface, covered over with a membrane ſimilar to that of a drum-head, and ſtretched in the ſame manner. This drum-like labyrinth exiſts on the left ſide of the *trachea*, in reſpect to its ſituation in the neck of the bird, in the ſame manner as the globular labyrinths, and in the *Scaup* ſeems to be the moſt conſpicuous of any that poſſeſs it. The flatted ſurface of the labyrinth is for the moſt part open, except round the rim, and has an irregular bony arch croſſing it from ſide to ſide; independent of theſe, the ſurface is covered with a delicate fine elaſtic membrane ſtretched over the ſurface, giving the idea of the head of a drum in miniature. The lower part of the

bony rim is much ſtronger than any other part of it, and is curved backwards, taking into its middle one of the *bronchiæ*. The other ſide conſiſts of a bony box, ſwelling in the middle, and furrowed by ſeveral tranſverſe bands: from this ſprings the other *bronchia*.

XX. ANAS FERINA—The POCHARD. *Tab.* xiv. *Fig.* 5, 6.

A. cinereo-undulata, capite brunneo, faſcia pectorali criſſo uropygioque nigro.

Anas ferina, *Linn. Syſt. Nat.* i. p. 203.—*Ind. Orn.* ii. p. 862.—*Raii Syn. Av.* p. 143. A. 10.—*Briſ. Orn.* p. 384. pl. 35. f. 1.

Millouin, *Buf. Oiſ.* ix. p. 216.—*Pl. Enl.* 803.

Der Rothhals, *Beſch. der Berl. Nat. Fr.* iv. p. 602. t. xvii. f. 5, 6.

Poker, Pochard, Red-headed Wigeon, *Gen. Syn.* vi. p. 523.—*Br. Zool.* No. 284.—*Will. Orn.* p. 367. t. 72.

The *trachea* of the *Pochard*, at firſt ſight, ſeems to be ſimilar to that of the *Scaup*, but, on inveſtigation, will be found to differ conſiderably. In the firſt place, it is full two inches ſhorter; it is alſo of very nearly the ſame dimenſions throughout, or narrowing very little at the bottom. The drum-like labyrinth approaches greatly to that of the *Scaup* in texture, but is more round on the upper ſide; it is however croſſed by a ſmall bony partition as in that bird—in both caſes, as may be ſuppoſed, by way of ſtrengthening the membrane which covers the cavity. The bony box, of which the other portion of the labyrinth conſiſts, is ſcarcely elevated on this ſide, and on the other much leſs ſo than is ſeen in the *Scaup*; it likewiſe forms an obtuſe angle with the reſt of the *trachea*, but in the *Scaup* it does not deviate from a continuation of a ſtraight line, although forming a conſiderable enlargement.

XXI. ANAS

XXI. ANAS FULIGULA—TUFTED DUCK.

A. criſtâ dependente, corpore nigro, abdomine ſpeculoque alarum albis.

Anas Fuligula, *Linn. Syſt. Nat.* i. p. 207.—*Ind. Orn.* ii. p. 869.—*Raii Syn. Av.* p. 142. A. 7.—*Briſ. Orn.* vi. p. 411. t. 37. 1.

Morillon, *Buf. Oiſ.* ix. p. 227. t. 15.—*Pl. Enl.* 1001.

Europäiſche Haubente, *Beſch. der Berl. Nat. Fr.* iv. p. 603.

Tufted Duck, *Gen. Syn.* vi. p. 540.—*Br. Zool.* No. 274.—*Will. Orn.* p. 365. pl. 73.

The *trachea* in the *Tufted Duck* is ſimilar in ſome reſpects to that of the *Scaup*, in others to that of the *Pochard*. The drum-like portion of it reſembles the ſame part in the laſt-named bird, inſomuch as ſcarcely to be diſtinguiſhed from it; but the bony box-like portion of it is elevated, and not otherwiſe to be diſtinguiſhed from that of the *Scaup*, than in being ſmaller. The *trachea* itſelf is of equal dimenſions throughout, though ſmaller than either of the foregoing. By attending to theſe particulars it cannot be miſtaken for any other, and in courſe will prevent the occaſion of giving a repreſentation in order to identify it.

XXII. ANAS TADORNA—The SHIELDRAKE. *Tab.* xv. *Fig.* 8, 9.

A. roſtro ſimo, fronte compreſſa, capite nigro-vireſcente, corpore albo variegato.

Anas Tadorna, *Linn. Syſt. Nat.* i. p. 195.—*Ind. Orn.* ii. p. 854.—*Raii Syn. Av.* p. 140. A. 1.—*Briſ. Orn.* vi. p. 344. pl. 33. f. 2.

Die Brandente, *Schr. der Berl. Nat. Fr.* iii. p. 373. t. vii. f. 3, 4.

Shieldrake, *Gen. Syn.* vi. p. 504.—*Br. Zool.* ii. No. 278.—*Will. Orn.* p. 363. pl. 70, 71.

The

The *Shieldrake* is one of the moſt beautiful of the Duck genus, and the lower part of the *trachea* in the male is of a ſingular conſtruction, being not ſtrictly ſimilar to any of the foregoing; it is pretty long, and nearly of equal dimenſions, except towards the bottom part, where it leſſens ſomewhat: juſt above the divarication are two bony kind of roundiſh bladders, one larger than the other, of unequal ſurface, and moſt delicate texture, being of ſo tender a fabric as ſcarcely to bear the preſſure of the finger, without indenting in young ſubjects, or breaking in older ones; and, when dry, putting on more or leſs of a ſhrivelled appearance, though in a recent ſtate they appear to be nearly tranſparent. Though ſo greatly different from the ſame part in the *Mallard*, as before deſcribed, yet its voice is ſaid not to be unlike that bird.

WE now proceed to ſome birds, in which not only an enlargement at the lower end of the *trachea* is obſervable, but likewiſe the *trachea* itſelf is either dilated, or otherwiſe enlarged, and ſometimes in more places than one.

XXIII. ANAS CLANGULA—The GOLDEN EYE DUCK.

Tab. XV. *Fig.* 1, 2.

A. nigro-alboque varia, capite tumido violaceo, ſinu oris macula alba.

Anas Clangula, *Linn. Syſt. Nat.* i. p. 201.—*Ind. Orn.* ii. p. 867.—*Raii Syn. Av.* p. 142. A. 8.—*Briſ. Orn.* vi. p. 416. t. 37. f. 2.—*Friſch.* t. 183, 184.

Le Garrot, *Buf. Oiſ.* ix. p. 222.—*Pl. Enl.* 802.

Die Quackerente, *Beſch. der Berl. Nat. Fr.* iv. p. 599. t. xvii. f. 1, 2.

Golden Eye, *Gen. Syn.* vi. p. 535.—*Br. Zool.* No. 276.—*Will. Orn.* p. 368. t. 73.

In

In the *Golden Eye* the windpipe is of a curious and wonderful ſtructure, for the labyrinth is not only of a different and much more complicated form than any of the foregoing, but a ſingular enlargement takes place about the middle of the *trachea* itſelf. This ventricoſe part conſiſts of divers joints or plaits placed obliquely, and folding over each other ſo as to admit of its being contracted into a very ſhort compaſs, or dilated to a great diſtance, as the lengthening or ſhortening of the neck may require. In the recent ſtate, theſe rings are eaſily, by compreſſion, folded into a ſpace of little more than an inch, and, by drawing out, may be made to occupy the length of four inches, or even longer; and being of a cartilaginous nature, they recover their tone after being drawn out, if left to themſelves.

It is manifeſt that the ſtructure of the *trachea* in this bird being ſo very unlike that of any other, will ever prevent its being confounded with a different ſpecies; and on this account I can with confidence aſſert, that the *Anas Glaucion* of Linnæus, or *Morillon*, commonly ſo called, has no exiſtence taking it as a ſpecies, for it is merely the *Golden Eye* in incomplete plumage. But this is not the only one known by the name of *Morillon*, for a ſpecimen put into my hands for that bird has proved to be the young of the *Tufted Duck*, and others that of the *Scaup*. Whatever ſhare the ſtructure of this ſingular kind of *trachea* may have in promoting the loudneſs of the voice, I will not here inſiſt on; but it is notorious that the cry is heard further off than in many others of the genus.

XXIV. ANAS FUSCA—VELVET DUCK. *Tab.* XV. *Fig.* 3——7.

A. nigricans, palpebrâ inferiore ſpeculoque alarum albis.

Anas fuſca, *Linn. Syſt. Nat.* i. p. 196.—*Ind. Orn.* ii. p. 848.—*Raii Syn.* p. 141. A. 4.—*Friſch.* t. 165.

Grande Macreuſe, *Buf. Oiſ.* ix. p. 242.—*Pl. Enl.* 956.

Velvet Duck, *Gen. Syn.* vi. p. 482.—*Br. Zool.* No. 272. t. 96.—*Will. Orn.* p. 363. t. 70.

The *trachea* here is more conſpicuous on account of the bony dilatation in the middle of it than for any other circumſtance: indeed a manifeſt difference from any other may be obſerved juſt below the *larynx*, being an oblong bony cavity of nearly an inch in length. From this part the *trachea* deſcends for near two-thirds of its length, when it ſwells out into a ſtrong bony hollow, flat on one ſide, and moderately convex on the other, about the ſize of a ſmall walnut. At the divarication the parts again loſe their rings, and become bony, not greatly enlarged, but equally ſo on both ſides—the two *bronchiæ* taking riſe at the under part of this laſt bony hollow. I have obſerved ſome diverſity in the *tracheæ* of this ſpecies, and in one in particular the hollow round bone was leſs oſſified; beſides which, the oblong bone next the *larynx* differed much in being ſhorter, (Fig. 6.) as alſo the bony part at the bifurcation of ſcarcely more than half the dimenſions, (Fig. 7.)—which laſt circumſtances taken together ſeemed to prove its being a young bird.

WE now cloſe the account of ſuch ſpecies of the *Duck Tribe* as the males of them have ſomewhat in the conformation of the *trachea* differing from the other ſex; and I flatter myſelf, that, by means of the preceding deſcriptions, aided by engravings of the parts in queſtion, the reader will find every thing as clear as was meant to be.

Endeavouring to add to this liſt, I have examined ſeveral others of the Duck genus, as the *Grey Lag*, *White-fronted*, *Bean*, *Bernacle*, *Brent* and *Scoter*; in none of which have I ever found any thing remarkable.—But I mean not to deſiſt from the enquiry, and recommend attention to it by others; for I truſt that many ſingular and curious occurrences will be diſcloſed on a further inveſtigation of the ſubject.

WE

WE paſs now to the *Merganſer* or *Gooſander* tribe, in every ſpecies of which frequenting this kingdom ſomewhat occurs worthy of notice.

XXV. MERGUS SERRATOR—RED-BREASTED MERGANSER.

Tab. xvi. *Fig.* 1, 2.

M. criſta dependente, pectore rufeſcente variegato, collari albo.

Mergus Serrator, *Linn. Syſt. Nat.* i. p. 208.—*Ind. Orn.* ii. p. 829.
Raii Syn. Av. p. 135. A. 4.—*Briſ. Orn.* vi. p. 237. pl. 23.
Le Harle huppé, *Buf. Oiſ.* viii. p. 273.—*Pl. Enl.* 207.
Der Haubentaucher, *Schr. der Berl. Nat. Fr.* iii. p. 374. t. 7. f. 5.
Meerachen, *Beckſt. Vog. Deutſch.* ii. p. 732, Note *.
Red-breaſted Merganſer, *Gen. Syn.* vi. p. 423.—*Br. Zool.* No. 261. t. 93.—*Will. Orn.* p. 336. t. 64.—*Edw.* t. 95.

The whole of the *Merganſer* genus, on outward inſpection, ſeems greatly allied to that of the *Duck*, and to differ chiefly in the bill, which, inſtead of being flattiſh, thick, and rounded at the end, is long and narrow, having the edges furniſhed with numerous ſharp proceſſes like the teeth of a ſaw, which has given riſe among ſportſmen to the name of *Saw-billed Ducks* or *Divers*. In the *Duck* genus the *trachea* will be found to be more or leſs compoſed of griſtly rings, approaching indeed in many very nearly to bone, and connected to each other by means of cartilaginous membranes, except in the labyrinthic parts, which are truly bone; but in the *Merganſer* tribe the whole ſeems to be compoſed of little elſe than bone, and, in the ſpecies now before us, the bony rings or plaits fold over one another in a remarkable manner, as may be ſeen in the figure. It is in this too, as in the genus of *Duck*, that the ſingularities obſerved in the *trachea* are only in the *male* ſex. But, to the point——

The *Red-breaſted Merganſer* has an enlargement of the *trachea* about the middle of its length, imitating that of the *Golden Eye*, in the ſame place, but differing, as before obſerved, in being bony inſtead of cartilaginous, and the bony plaits of which it conſiſts being moſt curiouſly furrowed or channelled tranſverſely: beſides this, the lower part of the *trachea* ends in a large and remarkable bony cavity, of an irregular heart ſhape, with two openings on one ſide, and one on the other; all of which are covered with fine membranes, in the ſame manner as before obſerved in the *Scaup*, *Gadwal*, and *Tufted Ducks*: from the bottom of this triangular bony box the two *bronchiæ* ariſe, and from thence loſe themſelves in the lungs, as in other ſubjects.

XXVI. MERGUS MERGANSER—GREATER GOOSANDER.

M. criſta longitudinali erectiuſcula, pectore albido immaculato, rectricibus cinereis ſcapo-nigricante.

Mergus Merganſer, *Linn. Syſt. Nat.* i. p. 208.—*Ind. Orn.* ii. p. 828. *Raii Syn. Av.* p. 134. A. 1.—*Brif. Orn.* vi. p. 231. t. 32.

Le Harle, *Buf. Oiſ.* viii. p. 267. t. 23.—*Pl. Enl.* 951.

Tauchergans, *Beſch. der Berl. Nat. Fr.* iv. p. 594. t. 18. f. 3.—*Beckſt. Vog. Deutſch.* ii. p. 724, Note *.

Merganſer or Gooſander, *Gen. Syn.* vi. p. 418.—*Br. Zool.* No. 260. t. 92. f. 1.—*Will. Orn.* p. 335. t. 64.

A ſufficient idea of the *trachea* of this ſpecies may be formed by a compariſon with that of the foregoing. In reſpect to the large bony caſe at the bottom, it is greatly ſimilar; but the upper part of the *trachea* differs in having two enlargements inſtead of one: the firſt placed about one third from the *glottis*, or entrance at the top; the ſecond nearly midway between the firſt and the bottom. This

is

is figured, among others, in the *Berlin Tranſactions*, by Dr. Bloch, as above referred to in the Synonyms.

From the ſcarcity of the *Merganſer* tribe in this kingdom, ſufficient opportunities rarely occur to enable us to aſcertain many points about them as might be wiſhed for. I am, however, now inclined to believe, as hinted in another place*, that the *Gooſander* and *Dun Diver* form but one ſpecies, and that the former is the *male* bird. What has, I believe, led us hitherto to ſuppoſe otherwiſe, is the cuſtom of this ſpecies of the two ſexes ſeparating after breeding time; the *old males* aſſociating together in one flock, and the *females*, with the *young birds* without diſcrimination, forming a ſeparate company; ſufficiently accounting for the flocks of theſe latter being moſt numerous: from this cauſe, and the plumage of the *male* being for a certain ſeaſon not unlike that of the *female*, and eſpecially diſſection proving that many males are always among them, the wonder ceaſes that the birds in queſtion ſhould have been ſet down by many writers for different ſpecies.

In *Germany* theſe birds are ſufficiently plentiful, and the ornithologiſts of that country have written much concerning them; the reſult of which is, that the *Merganſer* is conſidered by them as the *male*, and the *Dun Diver* the *female*, and the *Caſtor* of Linnæus not at all diſtinct, nor otherwiſe than the young bird. It would take up too much room here, in this Eſſay already ſufficiently long, to detail what Dr. Pallas †, Profeſſor Beckmann ‡, and Dr. Otto §, have ſaid on this ſubject in the *Berlin Tranſactions*; but I ſhould not do theſe Gentlemen juſtice, did I not recommend the peruſal of their various Diſſertations, which may be read with equal pleaſure and advantage.

* *Gen. Syn.* vi. p. 423.
† *Beſch. der Berl. Nat. Fr.* ii. p. 551.
‡ *Beſch. der Berl. Nat. Fr.* i. p. 170.
§ *Id.* iii. p. 456.

XXVII. MERGUS ALBELLUS—The SMEW. *Tab.* xvi. *Fig.* 3, 4.

M. criſta dependente, occipite nigro, corpore albo, dorſo temporibuſque nigris.

Mergus Albellus, *Linn. Syſt. Nat.* i. p. 209.—*Ind. Orn.* ii. p. 831. *Raii Syn. Av.* p. 135. A. 3.—*Brif. Orn.* vi. p. 245. t. 24. f. 1.

Petit Harle huppé, La Piette, *Buf. Oif.* viii. p. 271. pl. 24.—*Pl. Enl.* 449.

Die weiſſe Nonne, *Beſch. der Berl. Nat. Fr.* iv. p. 596. t. 18. f. 7.

Die weiſſe Tauchente, *Beckſt. Vog. Deutſch.* ii. p. 738.

Smew or White Nun, *Gen. Syn.* vi. p. 428.—*Br. Zool.* No. 262.—*Will. Orn.* p. 255. t. 64.

This beautiful bird is conſiderably ſmaller than the two laſt deſcribed, and the authors above referred to will point it out ſhould any one be ignorant of the ſpecies. The ſize of the *trachea* is ſmalleſt near the upper part, but enlarges as it approaches towards the middle; from whence to the bottom part it continues of nearly equal dimenſions, the texture conſiſting of bony rings, with ſcarcely any cartilage appearing to intervene. At the bottom part is a bony cavity as in the others, but of a different form, being much ſmaller in proportion, and differing in ſhape, the greater expanſe being from ſide to ſide, whereas in the others it is almoſt upwards and downwards: on one ſide is a round hole covered by a drum-like membrane, and on the oppoſite an oval ſmooth hollow bone uniting with it; from the bottom of theſe ariſe the *bronchiæ*.

In this, as in the former, two ſpecies have been created out of one, and owing preciſely to the ſame cauſe; which is, that of the *young male* having the *female* plumage for ſome length of time after growing to ſize. I have detected this ſome time ſince by the laby-

rinth of the ſuppoſed *male* of the *Mergus minutus* of Linnæus being in all reſpects ſimilar to that of the *Male Smew*, added to the aſſurance of ſome later writers, who have likewiſe aſcertained the fact, and penned their thoughts on the ſubject. It therefore may be concluded that we have no more than three diſtinct ſpecies of *Merganſer* which migrate into this country.

THERE are ſeveral other birds, beſides the above, concerning which I fear we ſhall hereafter find ourſelves miſtaken; but this is not the place for ſuch inveſtigation. The great increaſe in number of Gentlemen who make Natural Hiſtory their ſtudy, will no doubt greatly contribute to detect many errors which have hitherto been received as facts for want of due enquiry.

EXPLANATION OF THE PLATES.

TAB. LX.

Fig. 1. The *trachea* or windpipe of the *Wood Grous*, or *Cock of the Wood*, with its ſeveral appendages.—*a.* the tongue; *b b.* the the *os hyoides*, or tongue bone, with its parts; *c.* the *larynx*, with the orifice therein for the admiſſion of air; *d d.* muſcles which accompany the windpipe, one on each ſide; *e e e.* the *trachea*.

2. The *Marail Turkey*, ſerving to ſhew the circumſtance of the *trachea* riſing above the fleſh on the breaſt before it goes to the lungs.

3. The *Parraka Pheaſant*, in which the ſame ſingularity is obſerved in reſpect to the *trachea*, but in a greater degree, running down the breaſt the greater part of its length.

TAB.

TAB. X.

Fig. 1. The *Guan*—In this the *trachea* is much more elongated than in either of the foregoing, inſomuch as to double upwards in a remarkable manner.

2. Part of the windpipe of the *Indian Cock*:—*a a*. the two *bronchiæ*, or lung-pipes.

3. A figure of the ſame taken from a different ſubject, ſerving to ſhew how this part appears in ſome ſpecimens.

4. The *trachea* of the *Numidian Crane*, or *Demoiſelle*.

TAB. XI.

Two views of *Cuſhew Curaſſow*.

Fig. 1. A ſide view of the parts as they appear on diſſection:—*a*. pectoralis minor muſcle; *b*. its tendon; *c*. the ſternum; *d*. pectoralis major muſcle; *e*. the clavicle; *f*. the *glottis*; *g*. the *trachea* deſcending; *h*. the part where it begins to form the convolutions; *i*. the convolutions; *k*. the *trachea* where it dips into the thorax; *l*. ſtrong elaſtic fibres continued almoſt the whole length of the *trachea*, which has a fleſhy origin in the thorax (ſee o. fig. 2); *m*. the part which anſwers the ſame office as the ribs in other animals; *n*. muſcles terminating in faſcia.

2. The parts ſeen in a nearly oppoſite ſituation:—*a*. pectoralis minor; *c*. the ſternum; *d*. pectoralis major; *e*. the clavicle; *g*. the deſcending part of the *trachea*; *h*. the part where it begins to form the convolutons; *i*. the convolutions; *k*. the part where it has entered the thorax; *l*. the fibres which are continued from o. where they are fleſhy; *m*. the parts which anſwer to the ribs; *n*. a muſcle terminating in faſcia;

faſcia; *o.* the muſcle (one on each ſide), which aſſiſts in reſpiration and in ſtraitening the *trachea*.

TAB. XII.

Fig. 1. The ſternum or breaſt-bone of the *Wild Swan*, with the *trachea* in its proper ſituation.—The outer part of one ſide of the keel is taken off, in order the better to expoſe the internal contents to view.

2. The ſternum with the keel ſeen in front, ſerving to ſhew the opening into which the *trachea* enters and returns.

3. A ſimilar view of the ſame parts in the *Tame Swan*.

4. A view of the ſternum of the *Crane*, with the *trachea* in ſitu, —part of the keel taken away as in fig. 1.

TAB. XIII.

Fig. 1. The *trachea* of the *Teal*, the whole of its length.

2. The *trachea* of the *Garganey*.

3. An oppoſite view of the ſame:—*a a.* two muſcles, placed one on each ſide the labyrinth, very conſpicuous while recent.

4. The *trachea* of the *Shoveler*.

5. The ſame ſeen in an oppoſite direction.

6. The lower part of the *trachea* of the *Pintail*.

7. Ditto of the *Gadwal*.

8. The laſt ſhown on the oppoſite ſide.

9. The *trachea* of the *Wigeon*.

10. Ditto of the *Mallard*.

TAB. XIV.

Fig. 1. The *trachea* of the young *Moſcovy Duck*. (See that of the old one in TAB. XVI. f. 5, 6.)

2. The ſame ſeen on the other ſide.

Fig. 3.

Fig. 3. The *trachea* of the *Scaup Duck.*

4. The oppoſite ſide of the ſame: *a a*, an oblique muſcle ſerving to unite the baſe of the *bronchiæ* or lung-pipes, and may be traced in moſt ſubjects whilſt recent.
5. *Trachea* of the *Pochard.*
6. The ſame in an oppoſite direction.

TAB. XV.

Fig. 1, 2. Two views of the windpipe of the *Golden Eye.*

3. *Trachea* of the *Velvet Duck.*
4. The bony caſe of the laſt below the *larynx*, ſeen on the oppoſite ſide.
5. An oppoſite view of the bony hollow of the middle part.
6. View of the uppermoſt bony caſe taken from a different ſubject, ſerving to ſhew how this part appears in ſome ſpecimens.
7. View of the bottom part of the ſame *trachea.*
8. *Trachea* of the *Shieldrake.*
9. View of the ſame, ſeen on the oppoſite ſide.

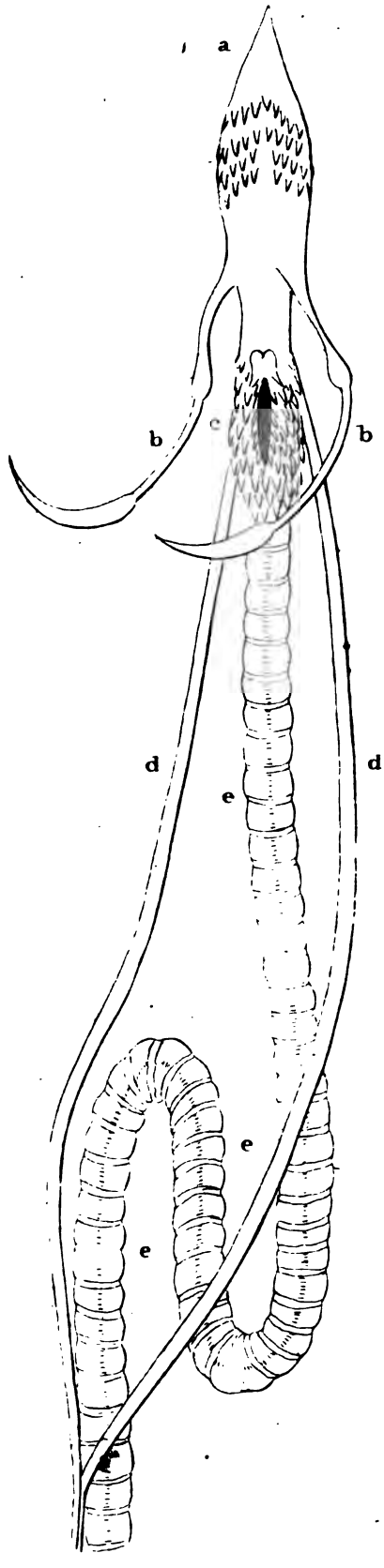
TAB. XVI.

Fig. 1. *Trachea* of the *Red-breaſted Merganſer.*

2. Ditto ſeen in the oppoſite direction.
3. *Trachea* of the *Smew.*
4. An oppoſite view of the ſame.
5. The *trachea* of an *Old Muſcovy Duck.* (See that of a younger one in TAB. XIV. f. 1, 2.)
6. The ſame ſeen on the other ſide.

IX. *Ob-*

Linn. Trans. IV. tab. 9. p. 128.



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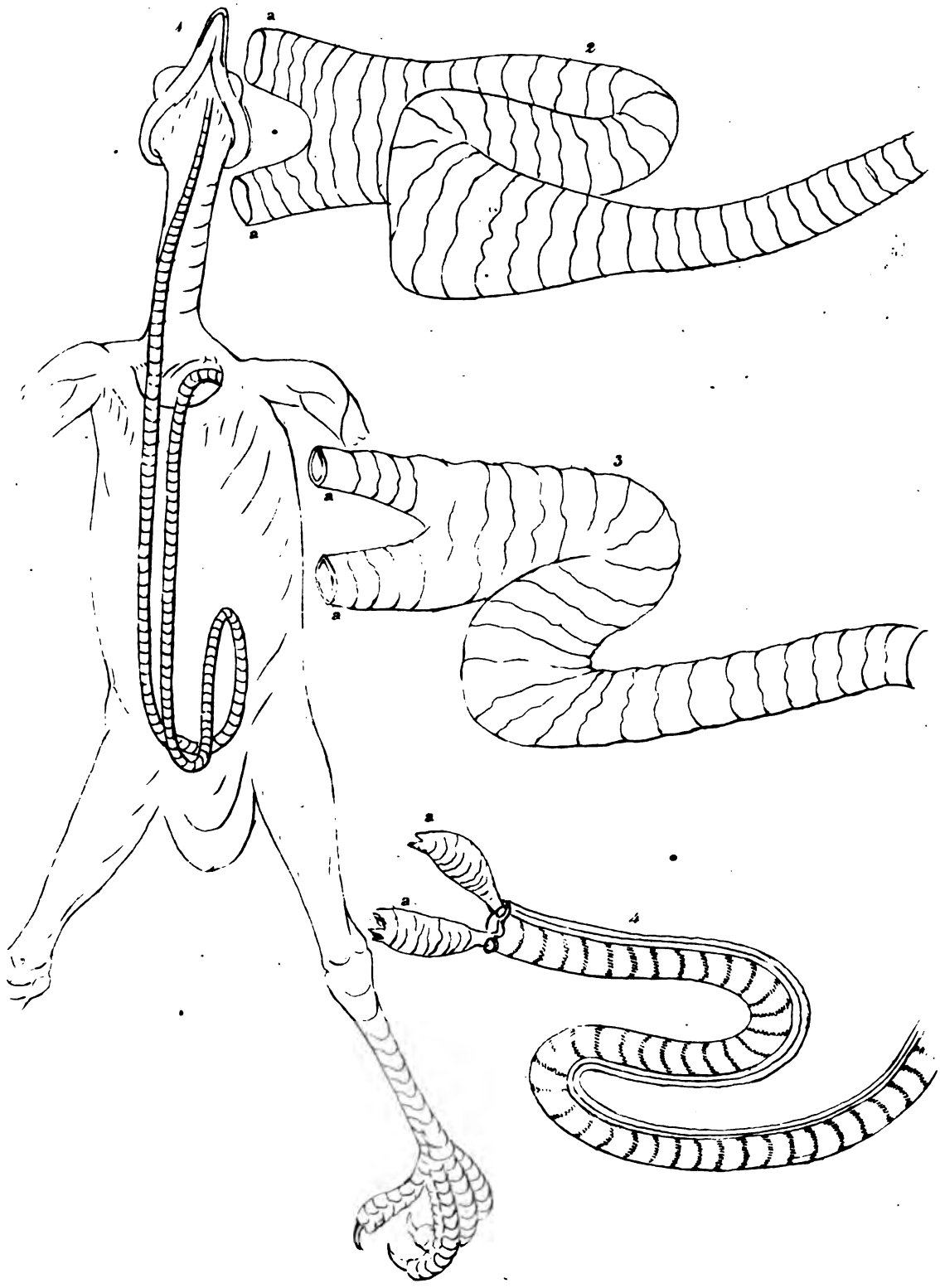

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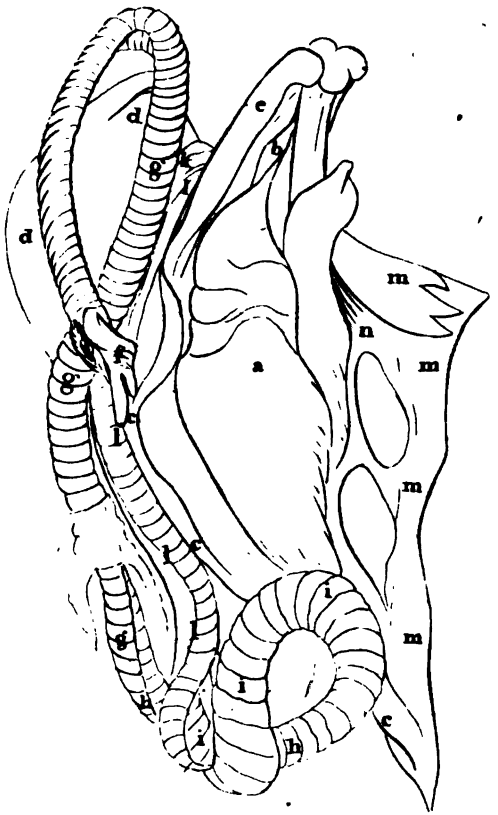

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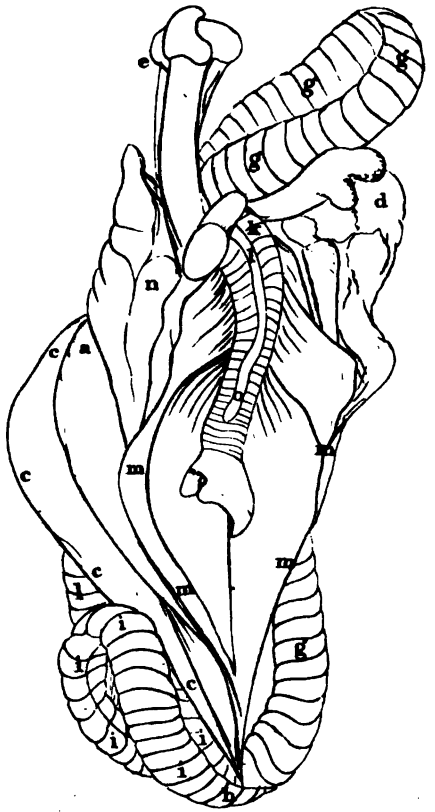

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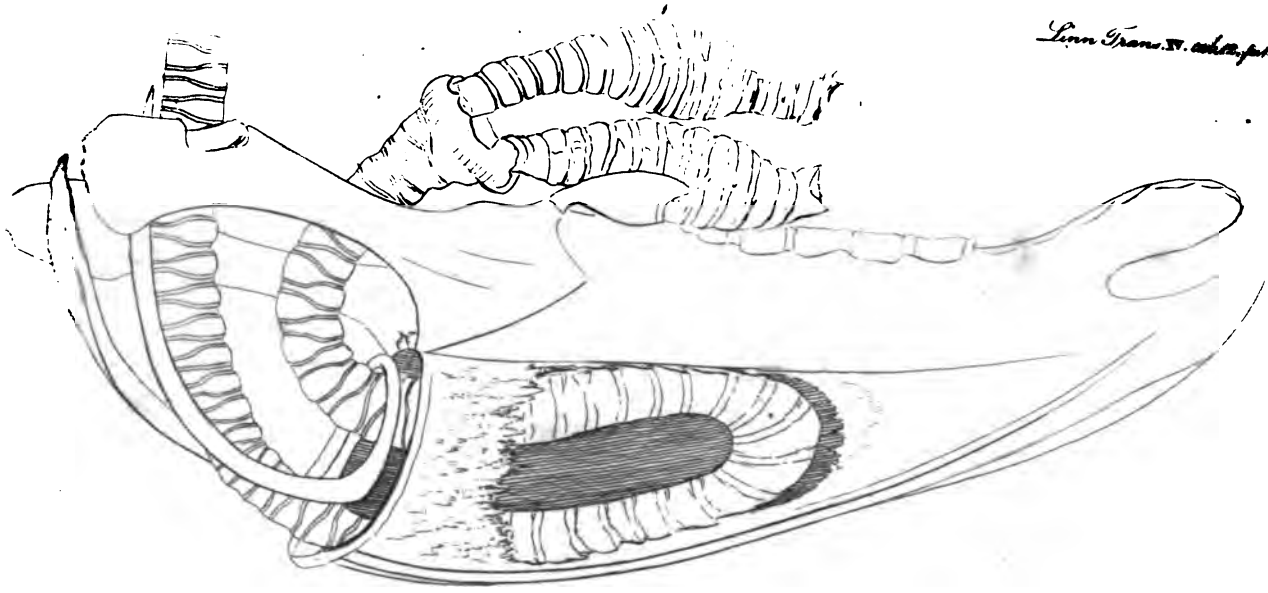
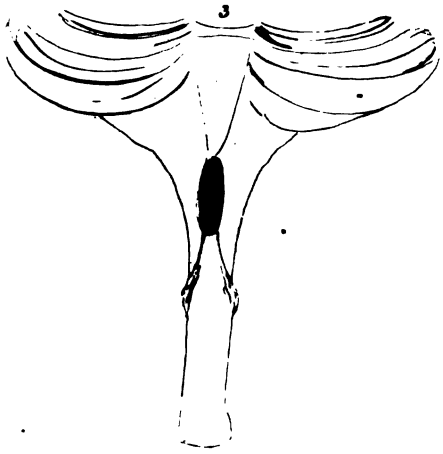
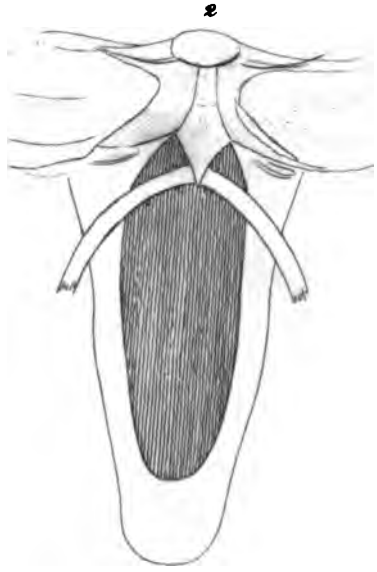
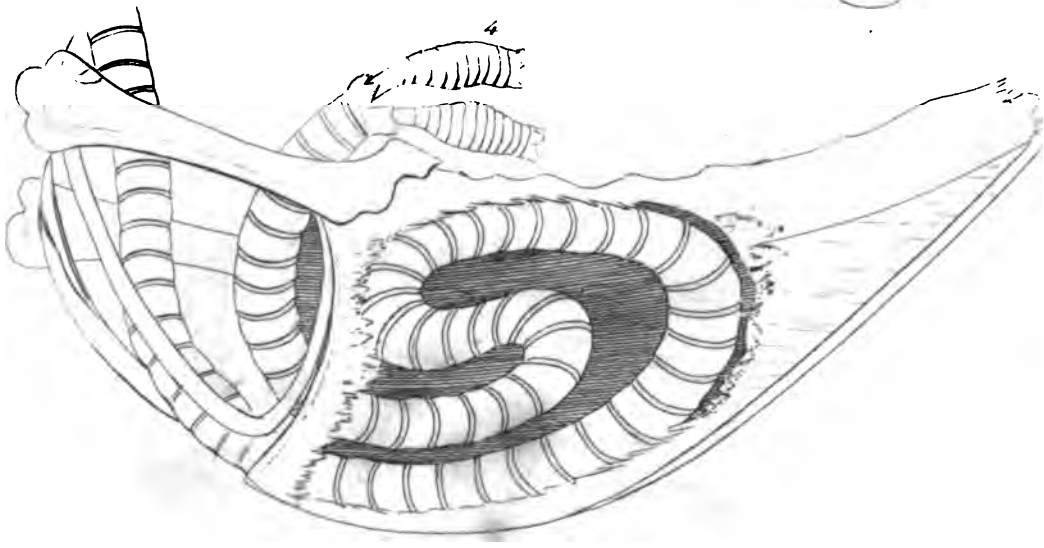
Linn. Trans. XV. 1827. p. 269.









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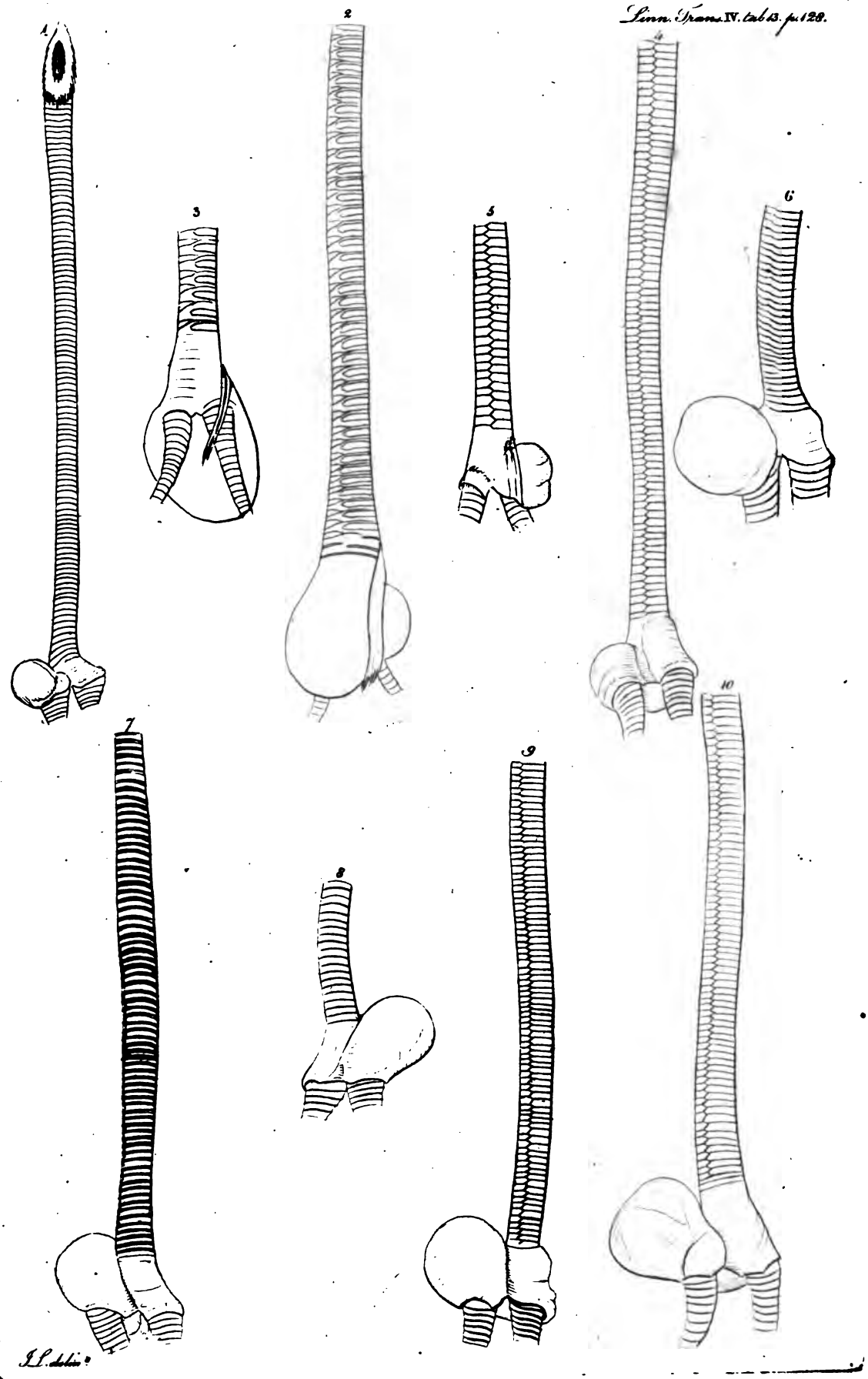

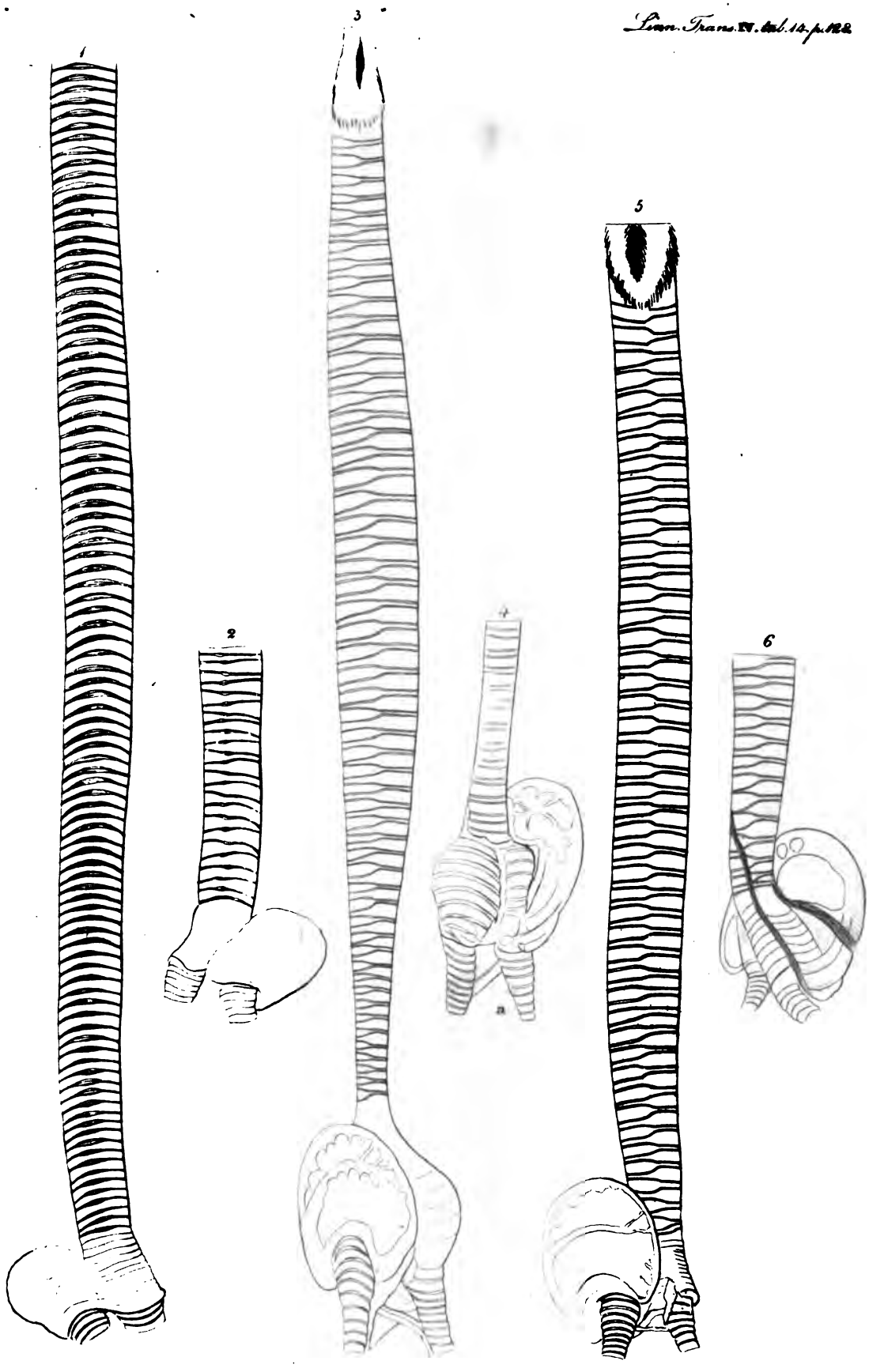

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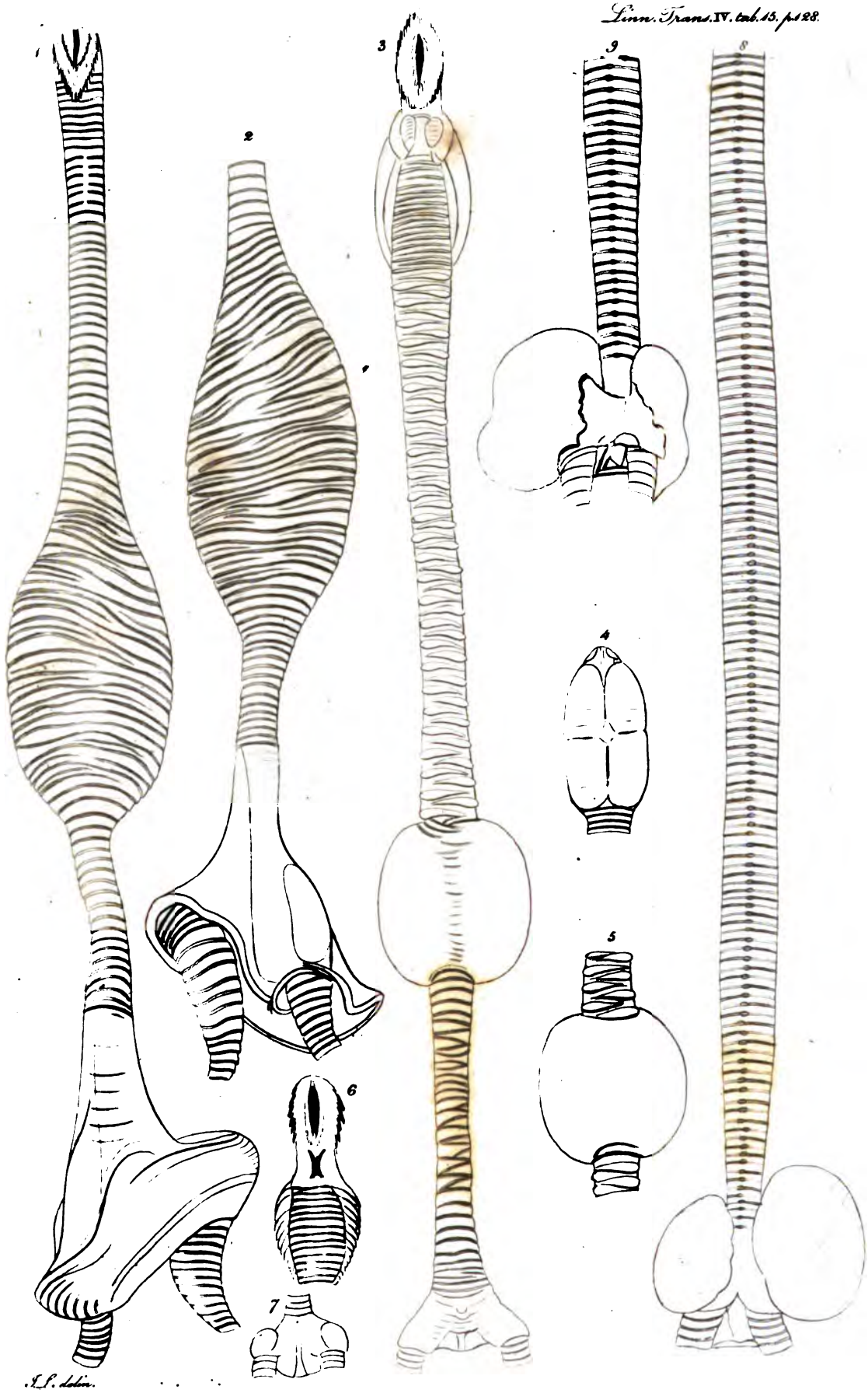
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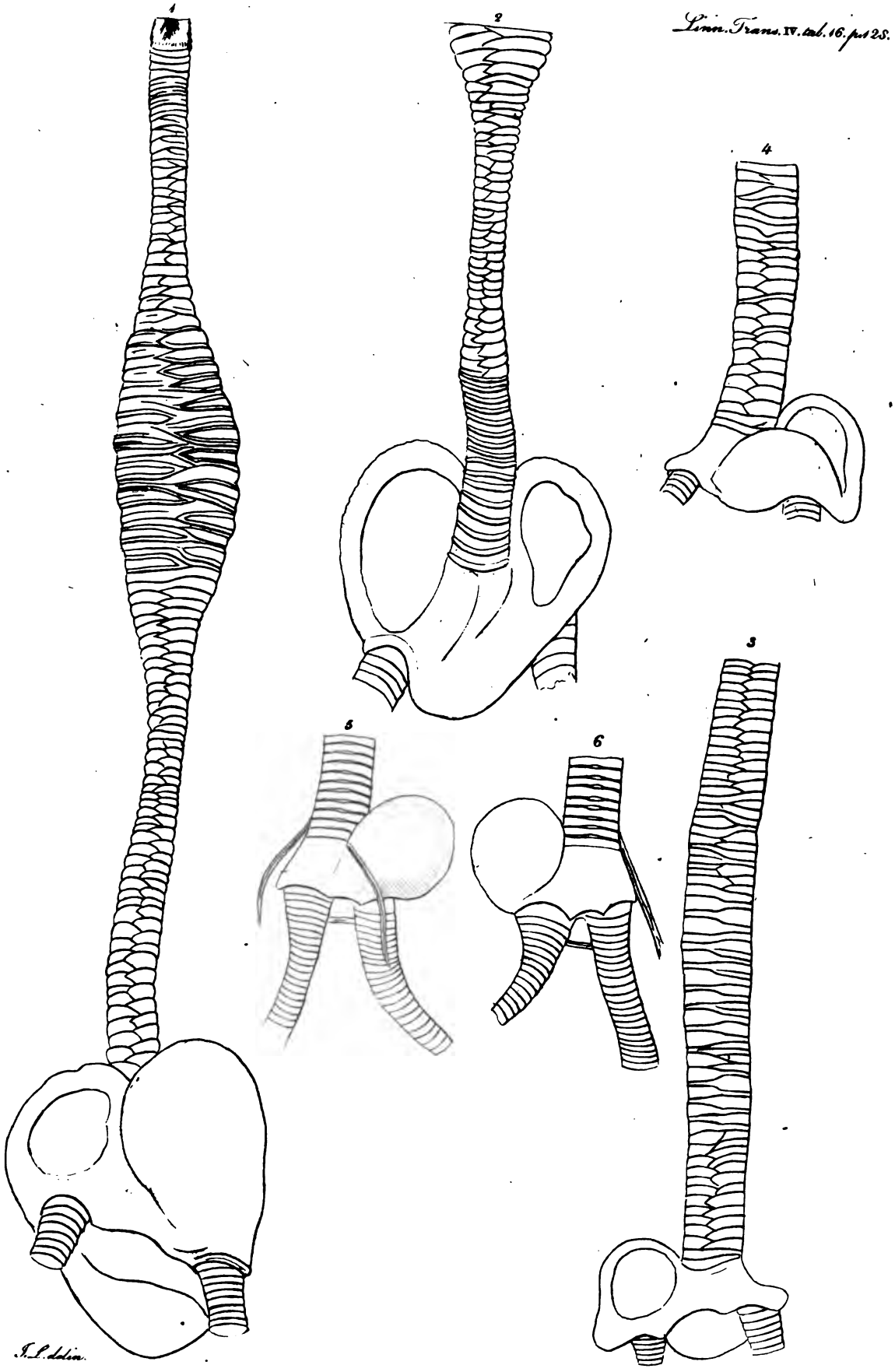


IX. *Obſervations on Bituminous Subſtances, with a Deſcription of the Varieties of the Elaſtic Bitumen. By Charles Hatchett, Eſq. F. R. S. Lond. and Edinb. F. L. S. &c.*

Read May 2, June 6, and July 4, 1797.

§ 1.

IT is now generally believed that the bituminous ſubſtances are not of mineral origin, but that they have been formed from certain principles of ſubſtances belonging to the organized kingdoms of Nature, which, after the loſs of animal and vegetable life, have ſuffered conſiderable changes by long contact and union with mineral bodies.

Theſe changes have been however ſo conſiderable, that the bitumens can no longer be referred to their firſt origin, and they are therefore regarded by general conſent as forming part of the preſent mineral ſyſtem.

The bituminous ſubſtances are:

Naptha,
Petroleum,
Mineral Tar,
Mineral Pitch,
Aſphaltum,

Jet,
Pit Coal,
Bituminous Wood,
Turf,
Peat, and

thoſe combinations of the oxides of certain metals with bitumen called Bituminous Ores*.

Thoſe who are acquainted with the nature of theſe ſubſtances will immediately perceive, that they may be formed into two diviſions: the firſt of which conſiſts of ſimple ſpecies, or unadulterated bitumens: and the ſecond is compoſed of bitumen mixed or combined with the earths, vegetable matter, and metallic oxides; ſo that theſe appear to merit the name of compound ſpecies.

I ſhall now firſt conſider how the ſimple ſpecies are connected with each other.

§ 2.

IT has been the opinion of ſome eminent Naturaliſts and Chemiſts, that naptha is an ethereal oil produced from the more compact and ſolid bitumens by a ſort of natural diſtillation. This however appears to be an hypotheſis founded upon analogy, and ſupported only by a few local facts which may often be queſtioned. But many facts and obſervations concur to prove that the contrary moſt frequently happens, and that the compact bitumens are often, if not always, formed from naptha and petroleum by inſpiſſation. I will not however now inſiſt upon the proofs of this, as the varie-

* As I intend only here to notice the modifications of naptha and petroleum, I have not mentioned amber and the honey-ſtone.

ties

ties of the elaſtic bitumen, which I ſhall ſoon deſcribe, will be ſufficient for the purpoſe*.

NAPTHA.

NAPTHA is a ſubſtance well known to Mineralogiſts as a light, thin, often colourleſs oil, highly odoriferous and inflammable, which is ſometimes found on the ſurface of the waters of ſprings, and at other times iſſuing from certain ſtrata.

When expoſed to the air, it becomes at firſt yellow, afterwards brown, and in the like proportion it thickens, and paſſes into

PETROL OR PETROLEUM.

THIS has a greaſy feel, is thicker than the preceding ſubſtance, is tranſparent or ſemitranſparent, and of a reddiſh or blackiſh brown colour. By air it becomes like tar, and then is called

MOUNTAIN OR MINERAL TAR, BITUMEN PETROLEUM TARDE FLUENS.

THIS ſubſtance is viſcid, and of a reddiſh or blackiſh brown or black. When burned, it emits a diſagreeable bituminous ſmell, and by expoſure to the air it paſſes into

* Bergman was of opinion, that the liquid bitumens were often, if not always, formed from thoſe which are ſolid, by the means of ſubterraneous heat; and expreſſes himſelf thus: "Cæterum ad fidem pronum eſt, naptham, petroleum, bituminoſoſque liquores, quibus abundat Aſia, plures harum materierum exhibens non tantùm ſcaturigines, ſed rivulos quoque, quibus etiam, parcius licet diſtributis, Auſtralis Europa non caret; probabile, inquam, eſt, has pinguedines liquidas variis antea terris inhæſiſſe exſiccatas, et mediante calore ſubterraneo, ſi non ſemper, ſæpe tamen fluiditatem recuperâſſe. Novimus ignem in alto haud raro agere, quamvis in ſuperficie vix obſcura ejuſdem indicia inveſtigare liceat: novimus præterea e ſicco aluminari ſchiſto petroleum extorqueri juſto caloris gradu, cui arte exponitur.—*Bergman de Productis Vulcaniis Opuſcula*, tom. iii. p. 238.

MOUNTAIN OR MINERAL PITCH—BITUMEN MALTHA.

THE mineral pitch much reſembles common pitch, and, when heated, emits a ſtrong unpleaſant odour, like the former ſubſtance. When the weather is cold, it may be broken, and then exhibits, internally, a glaſſy luſtre; but when warm, it is ſoftened, and poſſeſſes ſome tenacity. It is however ſuſceptible of a ſuperior degree of induration, and then becomes

ASPHALTUM—BITUMEN ASPHALTUM—PETROLEUM INDURATUM.

THIS is a light, brittle ſubſtance, of a browniſh black, or black. When broken, it ſhews a conchoidal fracture with a glaſſy luſtre. It has little of the bituminous odour, unleſs it is rubbed or heated. It eaſily melts, is very inflammable, and, when pure, burns without leaving any aſhes.

In this manner, naptha, by inſpiſſation, paſſes ſucceſſively through different ſtates until it becomes aſphaltum, which appears to be the ultimate degree of induration which the pure bitumens derived from naptha can receive.

I have at this time ſpecimens before me which prove theſe gradations; and I have ſeen a remarkable inſtance in a bitumen brought from the Iſland of Trinidad, which exhibits mineral tar paſſing into mineral pitch, and laſtly into aſphaltum *.

§ 3.

* The progreſſive changes of naptha into petroleum, mineral tar, mineral pitch, and aſphaltum, appears to be cauſed by the gradual diſſipation of part of the hydrogen of the bitumen, and the conſequent development or diſengagement of carbon. Hence, I am inclined to believe, ariſe the changes of colour, the degrees of inſpiſſation, and the increaſed proportion of carbon found in thoſe ſubſtances by chemical analyſis.

I would

§ 3.

THE diviſion which comprehends the ſimple bituminous ſubſtances derived from naptha, may therefore be conſidered as terminating in aſphaltum; but Nature appears to have glided on by an uninterrupted chain which connects the ſimple bitumens with thoſe which we have called compound; and this effect is produced by the gradual increaſe of the carbonic principle, and the introduction of extraneous matter, the different quantity of which, together with the greater or leſs degree of mixture or of chemical union, occaſion conſiderable changes in theſe ſubſtances, ſo that they are gradually removed from thoſe characters which diſtinguiſh the pure bitumens.

To form an accurate table of theſe gradations, it would be neceſſary to have comparative analyſes of the different bituminous ſubſtances, and alſo to contraſt the analyſes with the properties of theſe bodies. But at preſent theſe analyſes, for the greater part, are wanting; and although at ſome future time I intend to attempt a ſeries of ſuch experiments, I muſt now content myſelf with the obſervations and facts which I have been able to collect *. From theſe I am of opinion, that the moſt immediate gradation from aſphaltum (which is the laſt of the ſimple bitumens) into thoſe which are compound, takes place in the ſubſtance called

I would be underſtood however to mean that the carbon is only relatively increaſed, in reſpect to the other ingredients, in a given quantity of theſe bitumens, and that it predominates in proportion to the diſſipation of a certain portion of the hydrogen, which was originally neceſſary to the forming of the bitumen in conjunction with the carbon.

* This paper was written and read before I had ſeen the ingenious experiments which the celebrated Mr. Kirwan has publiſhed, in the laſt edition of his Elements of Mineralogy.—Vide vol. ii. p. 514.

JET.

JET.

JET is a substance well known to be of a full black, sometimes however inclining to brown. It is considerably harder and less brittle than asphaltum. It breaks with a conchoidal fracture, and the internal lustre is glassy. It has no odour except when heated, and it then resembles asphaltum. It melts in a strong heat, and, when burned, leaves an earthy residuum.

Wallerius considered jet as asphaltum which had become indurated by time, and Mr. Fourcroy is of the same opinion *. Others again have arranged it with the varieties of coal †. I am inclined however to believe, that it is neither asphaltum nor coal, but an intermediate substance which may be regarded as the first gradation from the simple bitumens into those which are compound. The matter of asphaltum undoubtedly enters into it in a large proportion, and has consequently stamped several of its characters upon it; but the increase of carbon, and of the extraneous or earthy matter which is intimately mixed or rather combined with it, has had so much influence, that the characters of coal are also in some measure apparent, and are rendered the more striking by the similarity of certain local circumstances which attend these two substances. The characters of coal are however by no means fully established in jet, but from this we pass immediately to another, in which these characters cannot be questioned.

This is the substance called

CANNEL COAL,

which is of a full black, of a smooth, solid, even texture; it breaks in any direction, and the transverse fracture is conchoidal. It

* *Elémens d'Hist. Nat. et de Chimie*, tom. iii. p. 456.

† *Widenmann's Handbuch der Mineralogie*, p. 628.

burns

burns well, and is ſo compact that it is often employed, like jet, to be formed into trinkets.

The great reſemblance which cannel coal has to jet in many of its properties, induces me to regard it as the next gradation of the compound bituminous ſubſtances, and as the leading variety of coal from which the others follow according to the degree of their bituminous character.

The limits of this paper will not allow me to enter into a circumſtantial account of all the other varieties of pit-coal; neither is it neceſſary, after the gradations of aſphaltum to jet, and of jet to coal, have been noticed. I ſhall not therefore deſcribe the varieties of coal known by divers names in different countries, and even in different provinces, ſuch as thoſe called in England caking coal, rock coal, ſplent coal, &c. &c.; but ſhall only obſerve, that the pit-coals in general appear to be compoſed of bitumen intimately mixed, or rather combined, with various proportions of carbon and earthy matter; and according to the intimacy of the union, and the exceſs of one or other of the ingredients, ſo the compound poſſeſſes more or leſs the characters of perfect coal, or, by various ſhades, paſſes into certain earthy or ſtony ſubſtances, which, although impregnated with bitumen, do not merit the appellation of coal, and theſe alſo at length gradually loſe the bituminous character *.

It is likewiſe worthy of notice, that the quantity of earthy matter does not appear to be the principal cauſe why pit-coals do not burn with the rapidity which is to be perceived in ſome other earthy ſubſtances impregnated with bitumen. For we may conclude, that

* From Mr. Kirwan's experiments it appears that carbon is a conſtituent principle of coal, and that the preſence of it is a principal cauſe of thoſe modifications which produce the ſpecies. It even ſeems chiefly to form the Kilkenny coal.—*Kirwan's Elements of Mineralogy*, vol. ii. p. 521.

the

the ſlow combuſtion of coal proceeds from the joint effects produced partly by the relative proportions of the bituminous, carbonaceous, and earthy ingredients, and partly by the more or leſs perfect degree of mixture which connects them together, and which degree of mixture, I believe, in many caſes, nearly approaches to chemical union, if not actually ſo: when, therefore, the degree of mixture is ſo perfect as that every particle of bitumen is connected with much carbon or earthy matter, it is not ſurpriſing that the rapid combuſtible property of the former ſhould be checked in a conſiderable degree; and, by a parity of reaſoning, when the mixture is groſs and imperfect, ſo that it conſiſts of a ſtony or earthy ſubſtance, which has ſimply imbibed bitumen, it is natural to expect that the bitumen (although leſs abundant than in coal) ſhould enter readily into combuſtion, which is vehement in proportion to the ſhortneſs of its duration; and this we find to be the caſe in many earthy ſubſtances, and looſe ſand-ſtones which are ſimply impregnated with bitumen.—To return, however, to the varieties of coal, I muſt obſerve, that, from the cauſes above-mentioned, the different characters and properties of coal appear to me to be produced. That in this manner, perfect pit-coal paſſes into ſchiſtoſe or flaty coal, and this again, by certain gradations, paſſes into the varieties of combuſtible or bituminous ſchiſtus, which alſo, by the gradual decreaſe of the bituminous ingredient, become at length confounded with the varieties of the common or argillaceous ſchiſtus.

We have a remarkable example of this in the gradations of bituminous ſchiſtus into argillaceous ſchiſtus, which are to be obſerved at Kimmeridge, on the coaſt of Dorſetſhire, where a peculiar bituminous ſchiſtus is found, which is uſed as fuel by the inhabitants, and is improperly called Kimmeridge coal.

By the ſeries of gradations which have been noticed in the foregoing

going pages, the ſimple bituminous ſubſtances appear to paſs into thoſe which are compound; and theſe alſo, by declining ſhades, at laſt paſs into ſubſtances appertaining to the claſs of earths and ſtones.

In the compound bituminous ſubſtances the prevalent earthy ingredient is for the greater part generally, if not always, argillaceous; and although certain calcareous grits (ſuch as the Portland ſtone*) as well as limeſtones and marbles are found impregnated with bitumen, yet I know not of any inſtance in which this happens to the degree requiſite to form a combuſtible ſubſtance.

This curſory view of the ſimple bitumens, and of their combinations, would be ſufficient as an introduction to the principal ſubject of this paper; but, to complete the ſeries, I ſhall make ſome obſervations on the vegetable ſubſtances which contain bitumen, and ſhall afterwards mention the mixtures of bitumen with metallic oxides.

§ 4.

WHEN we conſider the facts which apparently prove that vegetables have contributed principally to the formation of bitumen, we have every reaſon to expect that mixtures of vegetable matter with bitumen ſhould frequently occur. But by the mixture of bitumen with the parts of vegetables, we underſtand the remains and parts of vegetables mixed and connected with the bitumen which they themſelves have produced.

This ſeems to be the nature of the ſubſtance called

* The Portland ſtone, when recently broken in the quarries, emits a ſtrong bituminous odour, like the bituminous limeſtone or ſtink-ſtone. It is alſo full of extraneous foſſils, or at leaſt the veſtiges of them.

BITUMINOUS WOOD, as well as of TURF and PEAT.

BITUMINOUS or foſſil wood is found in many places; but in reſpect to that which is found at Bovey, near Exeter, and which is therefore called Bovey coal, there are ſome peculiarities which deſerve to be mentioned. The Bovey coal is a dark brown, light, brittle ſubſtance, which in texture and other external properties much reſembles wood which has been half charred. It is not found as ſcattered logs or trunks, but forms regular ſtrata.

The pits are on a heath which is flat and ſandy; the ſtratum of ſand is however but thin, after which a pale browniſh grey clay is found mixed with quartz pebbles. This prevails to about ſix feet, at which depth the firſt ſtratum of the coal commences. The quality of this is however much inferior to that of the ſubſequent ſtrata, which in all amount to ſeventeen, producing a depth of nearly ſeventy-four feet from the ſurface. Between each ſtratum of coal is a ſtratum of clay. The direction of the ſtrata is from eaſt to weſt, and the inclination or dip is from north to ſouth. The inferior ſtrata are thought to afford the beſt coal, and the coal is more ſolid and of a better quality towards the ſouth. The thickeſt ſtratum of coal is from ſix to eight feet *.

The Bovey coal burns readily with a flame like half charred wood: it does not crackle, and, if but moderately burned, forms charcoal; or if completely burned, it leaves a ſmall quantity of white aſhes exactly ſimilar to thoſe of wood. The ſmell of it when burning alſo reſembles that of wood, with a faint diſagreeable odour. It is certainly very remarkable that this ſubſtance ſhould form regular ſtrata, although it poſſeſſes the texture and moſt of the

* In the winter, twelve men can raiſe about 120 tons of this coal in a week, the whole of which is employed in a neighbouring Pottery.

properties

properties of wood; and that theſe ſtrata do not exhibit any of thoſe irregularities on their ſurfaces, which might be expected, on the ſuppoſition that they were formed by the roots, trunks, and branches of trees long buried in the earth. It is alſo difficult to imagine wood to have been tranſported and depoſited in this place at ſeventeen different periods, and yet it muſt be allowed that theſe ſtrata have been formed by ſucceſſive operations. I muſt confeſs, that after having twice viſited and examined the ſpot expreſsly for the purpoſe, I ſtill find myſelf utterly unable to offer any opinion upon the ſubject.

The characters of bitumen are but little apparent in the Bovey coal, and the ſuperior ſtrata even appear to have loſt a portion of their combuſtible principle, while the inferior ſtrata poſſeſs it. The lower parts alſo of theſe ſtrata are more compact and more combuſtible than thoſe parts which are immediately upon them *.

Another remarkable ſort of foſſil wood, which much reſembles the Bovey coal, and in like manner is arranged among the bituminous woods, is that found in Iceland, which is called by the inhabitants *Surturbrand*. This is rather harder than the Bovey coal, but in every other reſpect is the ſame. It alſo forms ſtrata many feet in thickneſs; but it is very extraordinary that theſe ſtrata appear to be formed of trunks of trees, which, in their tranſverſe

* At about 100 yards to the weſt of the pits, is a bog of conſiderable extent, where peat is cut, and decayed roots and trunks of trees are found, which do not, however, in the leaſt approach to the nature of the Bovey coal. Whether this bog has been in any manner connected with the formation of the above-mentioned ſubſtance, I do not pretend to determine.

A yelloviſh brown compact ſubſtance, which in colour and fracture reſembles ferruginous clay, is alſo found occaſionally with the Bovey coal: it is brittle, and is highly inflammable; it melts like a bitumen, and emits a ſmoke which in ſmell reſembles amber. This ſubſtance is but rarely found.

section, exhibit the concentric circles of their annual growth, with this difference, that the trunks have been so compressed as to be nearly flat, so that the circles appear like parallel lines connected at their extremities by a short curve.

I did not observe such an appearance at Bovey; but this would depend upon the position of the trunks of the trees, in respect to the section of the strata.

Chaptal *, Troil †, Bergman ‡, and many others, have been of opinion that the surturbrand is wood which has been charred by the heat of the lava. But I cannot discern why it should be supposed that it has been acted upon by fire, any more than that the Bovey coal has been subjected to the effects of the same agent. The qualities of the two substances are the same; and as (from Archbishop Troil's and Professor Bergman's account) the surturbrand is stratified, I think we may venture to pronounce that the circumstances

* *Elements of Chemistry*, vol. iii. p. 199.

† *Von Troil's Letters*, p. 43.

‡ Quid de ligno fossili Islandiæ sentiendum sit, gnaro in loco natali contemplatori decidendum relinquimus. Interea, ut cum Vulcani operationibus nexum credamus, plures suadent rationes, quamvis hunc usque modum ignoremus, quo situm texturamque adquisiverunt hæc strata. Scilicet truncis arborum perquam crassis constant, qualis in Islandiâ nullibi reperiuntur, et ne quidem hoc tempore crescere posse videntur. Hi situ horizontali in stratis multorum pedum crassitiei congesti sunt et petroleo plus minus penetrati, non jam molli, sed optimè indurato, a quo tam nigrorem, quam flammæ sub deflagratione qualitatem mutuantur. Sed quod in primis attentionem meretur, est truncorum in lamellas planas compressio.

Ponamus truncum arboris cujusdam transversim sectum, hinc, uti notum est, figura oritur in orbem rediens circiter circularis, quæ omnia monstrat annotina incrementa, extimo propemodum parallela. Fingamus jam talem sectionem in tenuem laminam compressam, et veram habebimus ligni fossilis, de quo heic agitur, ideam; nam in magnis hujus materiæ frustis, transversim sectis, quemlibet annotinorum orbium visu persequi licet, ita plerumque coactum, ut duas lineas fere parallelas exhibeat, quarum extrema brevi

stances under which they are found, are also similar*. The whole, therefore, of the opinion in favour of fire, appears to rest on the volcanic nature of Iceland; but it surely would be going too far were we to ascribe to fire all the phænomena which are observed in volcanic countries.

Bovey coal, like the surturbrand, resembles half-charred wood; and I will allow, and indeed am disposed to believe, that it is in a state nearly similar; but from this it does not follow that fire has been the cause.

Carbon is known to be one of the grand principles of vegetables, and also as that which is the most fixed, excepting the small portion of the earths contained in them. As a fixed principle, carbon appears to form, in great measure, the vegetable fibre; and after a certain degree of combustion, (by which the other principles have been dissipated,) it remains, and the particles of it keep the same arrangement which they possessed when the vegetable was complete. If, however, the combustion has been carried on with the

brevi flexura sunt adunata.—Quæ autem insanis requiritur vis, ut truncus cylindricus ita complanetur? Nonne antea particularum nexus putredinis quodam gradu fuerit relaxatus? Certe, nisi compages quodammodo mutatur, quodlibet pondus incumbens huic effectui erit impar. Cæterùm idem observatur phænomenon in omni schisto argillaceo.

Orthoceratites, quæ in strato calcareo conicam figuram perfectè servant, in schisto planum fere triangulare compressione efficiunt. Idem valet de piscibus, conchis, insectisque petrefactis. Causa adhuc latet, sed in utroque casu sine dubio eadem est, et digna quæ exploretur. Observatu quoque dignum est, quod idem reperiatur effectus, quamvis stratum calcareum sub schisto collocatum sit et majori ideo pondere comprimente onustum.——*Bergman de Productis Vulcanii Opuscula*, tom. iii. p. 239.

* "It is found (the surturbrand) in many parts of Iceland, generally in the mountains, in horizontal beds; sometimes more than one is to be met with, as in the mountain of Lack in Bardestrand, where four strata of surturbrand are found alternately with different kinds of stone."—*Troil's Letters*, p. 42.

free acceſs of air, the carbon enters into combination with oxygen and caloric, and forms carbonic acid.

We have many examples in which carbon is formed or rather liberated from thoſe ſubſtances with which it was combined in vegetables; and theſe are now explained as effects ſimilar to thoſe of combuſtion, although fire has not been the cauſe. In both caſes the carbon has been freed from the more volatile principles; and under circumſtances not favourable to the union of carbon with oxygen, the former muſt neceſſarily remain more or leſs undiminiſhed.

During the combuſtion of vegetable matter, the more volatile principles contained in the vegetable fibre (which with carbon alſo form the reſinous and other ſimilar ſubſtances) appear to be firſt ſeparated; and in proportion to this ſeparation, the other, more fixed ſubſtance, which we call carbon, is developed.

Thus, by the progreſs of combuſtion, wood becomes brown, and afterwards black; ſo that the ſtate of the wood ſhews the degree of combuſtion to which it has been ſubjected, or, in other words, how far the ſeparation of the other principles from carbon has been effected.

Combuſtion is therefore a ſpecies of analyſis by which the principles of vegetables are ſeparated, according to their affinities, and according to their degree of volatility. By this operation hydrogen and azote (if it be preſent in the vegetable) are firſt diſengaged and form new combinations, while the carbon is the laſt which is acted upon; ſo that unleſs a ſufficient quantity of oxygen be preſent, it remains fixed and unchanged.

But the ſame ſeparation of the vegetable principles happens whenever vegetables in the full poſſeſſion of their juices are expoſed to circumſtances which favour the putrid fermentation.—As in combuſtion,

combuſtion, ſo by the progreſs of putrefaction does the vegetable loſe its colour, become brown, and afterwards black; at the ſame time a gas is diſcharged, which is compoſed of hydrogen, azote, and carbonic acid.

When combuſtion is long continued with the free acceſs of air, the whole of the carbon is diſſipated in the ſtate of carbonic acid; but in the proceſs of putrefaction a conſiderable portion of carbon commonly remains even long after the putrid fermentation has ceaſed. Although, therefore, it is as readily developed by putrefaction as by combuſtion, it is not, however, when liberated from the other principles, ſo ſpeedily diſſipated by the former as by the latter proceſs.

According to the degree of combuſtion within certain limits the carbon is more or leſs apparent, and the like prevails according to the degree of putrefaction; ſo that whenever the cauſes which have promoted this ſpecies of fermentation have ceaſed, the vegetable ſubſtance will remain with more or leſs of its firſt principles, and with more or leſs viſible carbonic matter, according to the degree of putrefaction which has prevailed, and the vegetable ſubſtance will conſequently have the appearance and properties of wood which has been charred more or leſs.

To this cauſe, therefore, I am inclined to attribute the formation and appearance of the Bovey coal and ſurturbrand; and I believe that the portion of oily and bituminous matter, which I have obtained from them by diſtillation, is nothing more than the remainder of the vegetable oils and juices which have been partly modified by mineral agents*.

The

* "Coal not only forms the reſiduum of all vegetable ſubſtances that have undergone a ſlow and ſmothered combuſtion, that is, to which the free acceſs of air has been prevented,

The characters of bitumen are much more apparent in turf and peat, than in the greater part of the foſſil woods. Turf is well known to be compoſed of the parts of vegetables, ſuch as ſmall roots, twigs, &c. mixed with a portion of petroleum; and peat is the ſame, excepting that it generally contains more of earthy matter, or that the vegetables have undergone a more complete decompoſition.

The boggy nature of the places in which they are found, proves that a certain degree of maceration is neceſſary to form the bituminous matter which they contain; and I have already noticed, that every fact appears to demonſtrate, that the bitumen is a product of thoſe vegetables, the remains of which conſtitute the other ingredient of turf and peat.

The different proportion of vegetable matter, of bitumen, and of earth, together with the different ſtate of the bitumen, as well as the degree of perfection reſpecting the formation of it from the vegetable principles, contribute to alter the properties and characters of the compound, and thus produce varieties. It is believed that theſe ſubſtances have been materially concerned in the formation of pit-coal, and ſome eminent mineralogiſts maintain that there is an uninterrupted ſeries which connects the varieties of turf and peat with thoſe of coal*.

§ 6.

vented, but alſo of all putrid vegetable and animal bodies: hence it is found in vegetable and animal manures that have undergone putrefaction, and is the true baſis of their ameliorating powers; if the water that paſſes through a putrefying dunghill be examined, it will be found of a brown colour, and if ſubjected to evaporation, the principal part of the reſiduum will be found to conſiſt of coal. All ſoils ſteeped in water communicate the ſame colour to it in proportion to their fertility; and this water being evaporated, leaves alſo a coal, as Meſſrs. Haſſenfraz and Fourcroy atteſt."—*Kirwan on Manures*, p. 154, Vol. v. of *The Tranſactions of the Royal Iriſh Academy*.

* Man findet in der natur einen ununterbrochenon übergang von dem raſen und papiertorf

§ 5.

LITTLE need be ſaid concerning thoſe mixtures of bitumen with metals or their oxides which are ſometimes called the bituminous ores of mercury, copper and iron, for they ſhould rather be arranged with the adulterated or impure bitumens. Few of them contain the metallic ingredient in a proportion ſufficient to cauſe the compound to be worked as an ore; and the only exception with which I am acquainted, is the ſubſtance found at Idria, in Carniola, compoſed of mercury mixed with bituminous matter, a quintal of which, according to Mr. de Born, affords from fifteen to twenty pounds of mercury *.

§ 6.

FROM the preceding obſervations it will appear, that although I have firſt mentioned naptha in order that I might be better underſtood in reſpect to the degree of connection prevailing between the bituminous ſubſtances, yet, to have followed them from their origin and the period of their formation, I ſhould rather have begun with thoſe ſubſtances which moſt clearly point out how much the vegetable kingdom has contributed to the production of them, with the probable occaſional concurrence of animal ſubſtances.

That the latter have contributed in ſome meaſure to the forming of bitumen, we can only infer from the veſtiges and exuviæ of animals, which ſo commonly accompany bituminous ſubſtances;

papiertorf durch den moor oder ſumpftorf in den pechtorf, und von dieſem in die braun ſchiefer und pechkohle.—*Widenmann*, p. 630.

* *Catalogue de la Collection des Foſſiles de M^lle. de Raab*, tom. ii. p. 294, 348, & 400.

but no doubt can be entertained in reſpect to vegetables, for it appears that bitumen is formed from them by long maceration, and by other proceſſes at preſent unknown to us:

That when certain portions of vegetable matter remain undecompoſed, and are mixed with the petroleum thus produced, the varieties of turf and peat are formed:

That wood in general contributes to the production of bitumen; but does not ſeem to retain it, after the formation of it, in ſo conſiderable a proportion as the foregoing ſubſtances:

That the bituminous matter thus formed, and occaſionally ſeparated, is in different ſtates according to the degree of inſpiſſation:

And laſtly, with various proportions of carbonic and earthy matter, it forms jet, coal, and bituminous ſchiſtus; and with metallic ſubſtances it produces thoſe compounds called bituminous ores.

§ 7.

ABOUT the year 1786 a new ſpecies of bitumen was diſcovered near Caſtleton, in Derbyſhire, which much reſembles, in elaſticity and colour, the ſubſtance known by the name of cahout-chou, or Indian rubber.

Mr. de Born was, I believe, the firſt who mentioned it*; but as he appears to have known only one variety of this ſingular ſubſtance, I am induced to hope that a deſcription of many other varieties, which have ſince been found, will not be unacceptable to this Society.

The elaſtic bitumen, which reſembles the cahout-chou, was firſt diſcovered in the cavities of a vein in the lead-mine called Odin, which is near the baſe of Mamtor, to the north of Caſtleton. The

* *Catalogue de la Collection de Mlle. de Raab*, tom. ii. p. 77.

ore

ore of this mine (which is ſuppoſed to be one of the moſt ancient in England) is galena, accompanied by fluor, calcareous and heavy ſpars, quartz, blende, calamine, ſelenite, aſphaltum, and the elaſtic bitumen, although the latter is now rarely found*. Another ſpecies of the elaſtic bitumen has within about three years been found in a neighbouring rivulet; but I ſhall not at preſent notice it, as I intend firſt to deſcribe the varieties of that which was firſt diſcovered, and which reſembles the cahout-chou. In order to do this with more perſpicuity, I ſhall deſcribe the ſpecimens belonging to my collection, according to the mode in which I have arranged them.

SPECIES THE FIRST.

A, No. 1.

ELASTIC bitumen of a yellowiſh brown colour, part of which is almoſt liquid like petroleum, and adheres to the fingers; the other part is of a darker colour, of a mammillary form, does not adhere to the fingers, and is ſoft and elaſtic. This is on a grey bituminous limeſtone, with white calcareous ſpar in the figure of hexaedral pyramids, forming that which is called the dog-tooth ſpar.

A, No. 2.

Bitumen of a yellowiſh brown, partly liquid, and partly elaſtic, which, however, adheres to the fingers; on pale grey limeſtone, with cryſtals of white fluor ſpar, blende, and galena.—On another part of the limeſtone are ſome globules of bitumen of a reddiſh brown, perfectly hard and brittle.

* I am indebted to the ingenious Mr. White Watſon, of Bakewell, for much information reſpecting the local circumſtances which attend this bitumen.

A, No. 3.

Dark brown bitumen of a ſtalactitical form, hard, but in ſome degree elaſtic.

A, No. 4.

Bitumen of a reddiſh brown, in the form of globules, ſome of which are elaſtic, and others hard: on browniſh-grey limeſtone, accompanied by cryſtallized white fluor, dogtooth calcareous ſpar, and pyrites in ſmall cryſtals, ſome of which are on the ſurface of the globules of bitumen.

A, No. 5.

The ſame of a darker brown, of a ſtalactitical form, hard and brittle; on pale brown calcareous ſpar, impregnated with bitumen.

A, No. 6.

Bitumen of a dark reddiſh brown, very hard; on pale brown ſparry ſtink-ſtone, with grey limeſtone, in which are ſome coralloides.

A, No. 7.

Bitumen of a dark yellowiſh brown, elaſtic, but very ſoft, ſo that it adheres to the fingers.

A, No. 8.

The ſame thinly ſpread over grey ſparry ſtink-ſtone.

A, No. 9.

Bitumen of a browniſh olive colour, which becomes reddiſh brown by the air, but when oppoſed to the light it appears ſemi-tranſparent,

tranſparent, and of a yellowiſh brown inclining to orange. It is ſoft, very elaſtic, and (when recently cut) adheres to the fingers.

A, No. 10.

The ſame of a darker brown, and harder in a ſmall degree. The ſpecific gravity of this ſpecimen is 0,9053; water being eſtimated at 10,000 at temp. 60°.

A, No. 11.

Bitumen of a dark brown, harder than the former. This exactly reſembles the cahout-chou in the degree of elaſticity, and in the property which it poſſeſſes of removing the traces of black-lead.

A, No. 12.

The ſame, but rather harder.

A, No. 13.

The ſame of a blackiſh brown, which is ſlightly elaſtic when the weather is warm, but is brittle when cold.

A, No. 14.

The ſame of a blackiſh brown, nearly black, which ſcarcely poſſeſſes any elaſticity; it breaks, and reſembles aſphaltum in luſtre, colour and fracture.

A, No. 15.

The ſame of a reddiſh brown, perfectly hard and brittle. The characters of aſphaltum are complete in this ſpecimen.

The ſpecific gravity is 10,133.

The other ſpecies of elaſtic bitumen, which I ſhall diſtinguiſh by the

the letter B, has been found during the laſt three years in a rivulet which runs at the baſe of Mamtor, from Weſt to Eaſt, at a ſmall diſtance from Odin mine.—The varieties of it, in my poſſeſſion, are as follow:——

SPECIES THE SECOND.

B, No. 1.

ELASTIC bitumen, which, recently cut, exactly reſembles fine cloſe cork in colour and texture, but, by the air, in a few days it becomes of a pale reddiſh brown.—This forms a thin coat, which completely covers a maſs of elaſtic bitumen, which is ſoft, and of a browniſh olive colour, like A, No. 9.

B, No. 2.

The ſame, excepting that the coat or cruſt is much thicker.

B, No. 3.

The ſame, but the coating is thicker than that of No. 2, and the browniſh olive-coloured bitumen much leſs in quantity.

B, No. 4.

The ſame, excepting that the greater part of the maſs reſembles cork, ſo that only a very ſmall nucleus of the brown bitumen remains*.

B, No. 5.

The ſame, excepting that the bitumen, which is coated, is in the ſtate of aſphaltum.

The ſpecific gravity of this ſpecimen is 0,9881.

* One of the ſpecimens in my poſſeſſion, ſimilar to B, No. 4. weighs between 13 and 14 pounds.

B, No. 6.

Elaſtic bitumen, the whole maſs of which reſembles fine cork.—The ſpecific gravity is 0,9748.

B, No. 7.

The ſame, but friable, and apparently paſſing by decompoſition into an ochraceous coloured powder.

THE varieties of the firſt ſpecies of the elaſtic bitumen, or that which is like the cahoût-chou, evidently appear to be formed from a naptha or petroleum, which, like that which produces the other ſimple bituminous ſubſtances formerly mentioned, is ſuſceptible of various degrees of inſpiſſation.

All the varieties of the firſt ſpecies, from No. 1, to No. 15, may be regarded as thus formed, for in theſe we can trace all the modifications comprehended between petroleum and aſphaltum; with this difference, that the intermediate modifications of this ſpecies have the remarkable property of elaſticity, which is the moſt complete in the variety which occupies the middle place between petroleum and aſphaltum.

The ſecond ſpecies B, or that which reſembles cork, appears ſo different from that marked A, that it is not at firſt eaſy to conceive how they are connected, or at leaſt the difficulty muſt appear great to thoſe who have only ſeen ſpecimens of each ſpecies complete in their reſpective characters. But, from an attentive examination of many ſpecimens, and particularly of thoſe which I have deſcribed, I am convinced that the varieties of the ſpecies B are only modifications of the ſpecies A, produced probably by long maceration in the water of the rivulet in which this ſpecies is found, to the effects of which we may, with ſome appearance of reaſon, add the viciſſitudes

viciſſitudes of the ſeaſons, of air, and of the weather in general, as well as thoſe of reiterated moiſture and dryneſs occaſioned by the riſe and fall of the water of the rivulet; and what ſeems to corroborate this opinion is, that the ſubſtance, like cork, incruſts the ſpecies A, and appears to be only a change which has penetrated deeper into the ſubſtance of it in proportion to the duration of the cauſes which I have mentioned, ſo that at length the original ſubſtance no longer remains in its primitive ſtate. I do not believe, however, that this change ariſes from any alteration in the conſtituent principles, but merely from a partial and minute diſunion or diſintegration of the particles of the original ſubſtance, as both ſpecies melt into one which is perfectly ſimilar. I muſt alſo add, that the ſpecies A burns eaſily, and with rapidity; but the ſpecies B burns with ſome difficulty, and crackles as if it had imbibed a quantity of water.

I have remarked, when the different varieties of the elaſtic bitumen were melted, that they completely loſt the elaſtic property, and a quantity of air or gas appeared to be diſengaged, particularly from the ſpecies B. I alſo obſerved, that the ſubſtances which remained after this operation, correſponded, in reſpect to conſiſtence, with thoſe which had been employed, as the following Table will ſhew:——

A, No. 7 and 8. ...	produced a thick liquid petroleum, not apparently different from that which is commonly known.
A, No. 9.	produced a thicker petroleum, approaching to mineral tar.
A, No. 11 and 12.	produced mineral tar.
B, No. 6.	produced the ſame, approaching to mineral pitch.
A, No. 13.	produced mineral pitch.
A, No. 14 and 15.	did not ſuffer any change, but remained as at firſt, with all the characters of aſphaltum.

From what I have related, I ſuſpect that the elaſtic property is occaſioned by the interpoſition of very minute portions of air or ſome other elaſtic fluid between the parts of the bitumen, and that this takes place by reaſon of ſome unknown cauſe at the time of formation; but when theſe bitumens are melted, the elaſtic fluid is liberated, and the maſs loſes that fine ſpongy texture which I ſuſpect to have been the cauſe of the elaſtic property *.

Derbyſhire is well known as a country which exhibits, in the moſt ſtriking manner, the remarkable changes which our globe has ſuffered. In every part of it, the moſt indiſputable evidences appear of ſome great and extraordinary revolution; and there is not any place where extraneous foſſils, ſuch as the remains and impreſſions of vegetables and animals, are more abundant.

Bitumen, in other countries, is moſt commonly found where theſe preſent themſelves; and, in like manner, there are few countries which abound ſo much with bitumen as Derbyſhire.

Whoever has examined the limeſtone rocks about Matlock, and moſt other places in this county, muſt be convinced of the truth of this aſſertion.

The limeſtone and calcareous ſpars alſo, where the elaſtic bitumen is found, are, for the greater part, in the ſame ſtate; ſo that no doubt can be entertained but that this bitumen has had the ſame origin as thoſe which are more generally known; and it would

* The elaſtic bitumen, A, No. 9. when digeſted in ſulphuric ether in a temperature of about 55°, is partly diſſolved. The ſolution is yellowiſh brown when oppoſed to the light; but when otherwiſe viewed, is like the bitumen, that is, of a browniſh olive colour. By ſpontaneous evaporation, the etheric ſolution leaves a yellowiſh brown bitumen, which is totally devoid of elaſticity. The undiſſolved portion (like the cahout-chou under ſimilar circumſtances) is ſoftened, and is much increaſed in bulk.

The ſpecies B, No. 6. cut into very thin ſlices, communicates a yellow tinge to ſulphuric ether; in other reſpects it is but little affected.

undoubtedly have been confounded with them, had it not been diſcovered when paſſing from the liquid to the ſolid ſtate.

The elementary principles of bitumen are, hydrogen, carbon, ſometimes azote, and probably ſome oxygen, which, by its action on the other principles, tends to form the concrete bitumens, and alſo produces that portion of acid obtained by chemical operations. Theſe ſame principles, hydrogen and carbon, conſtitute the vegetable oils and reſins; and the ſame, with ſome azote, form the oils and greaſe of animals. Now it is known that very ſmall changes in the reſpective proportions of theſe ingredients, and in the circumſtances which attend the combination of them, will cauſe conſiderable variations in the nature of the products; and in like manner, it appears very probable, that when the organized bodies in their recent ſtate, and in the full poſſeſſion of the above-mentioned principles, have been buried in a ſituation where theſe principles have been long elaborated under certain favourable circumſtances, and ſubjected to the action of mineral bodies; I ſay that it appears highly probable, that a new combination, which we call bitumen, may be formed, which, although different in ſome reſpects from the vegetable and animal products, ſtill, however, retains many characters of thoſe ſubſtances from the principles of which it has been formed.

HAMMERSMITH,
April 26, 1797.

X. *An Account of the Jumping Mouſe of Canada. Dipus Canadenſis. By Major General Thomas Davies, F. R. S. and L. S.*

Read June 6, 1797.

AS I conceive there are very few perſons, however converſant with Natural Hiſtory, who may have ſeen or known there was an animal exiſting in the coldeſt parts of Canada, of the ſame genus with the Jerboa, hitherto confined to the warmer climates of Europe and Africa; I take the liberty of laying before this Society the following obſervations (accompanied by a drawing) on an animal of that kind, procured by myſelf in the neighbourhood of Quebec, during my laſt reſidence in that country. As I do not recollect to have ſeen this animal either figured or deſcribed by any author in Natural Hiſtory, I flatter myſelf, theſe obſervations may afford ſome ſatisfaction to the Preſident and Members of the Linnæan Society. The ſpecimens from which I made the drawing are now in my collection. With reſpect to the food, or mode of feeding of this animal, I have it not in my power to ſpeak with any degree of certainty, as I could by no means procure any kind of ſuſtenance that I could induce it to eat; therefore, when caught, it only lived a day and a half. The firſt I was ſo fortunate to catch was taken in a large field near the Falls of Montmorenci, and by its

having ſtrayed too far from the ſkirts of the wood, allowed myſelf, with the aſſiſtance of three other gentlemen, to ſurround it, and after an hour's hard chaſe to get it unhurt, though not before it was thoroughly fatigued, which might in a great meaſure accelerate its death. During the time the animal remained in its uſual vigour, its agility was incredible for ſo ſmall a creature. It always took progreſſive leaps of from three to four, and ſometimes of five yards, although ſeldom above 12 or 14 inches from the ſurface of the graſs; but I have frequently obſerved others in ſhrubby places and in the woods, amongſt plants, where they chiefly reſide, leap conſiderably higher. When found in ſuch places, it is impoſſible to take them, from their wonderful agility, and their evading all purſuit by bounding into the thickeſt cover they can find.

With reſpect to the figure given of it in its dormant ſtate, I have to obſerve, that ſpecimen was found by ſome workmen, in digging the foundation for a ſummer-houſe, in a gentleman's garden about two miles from Quebec, in the latter end of May 1787. It was diſcovered encloſed in a ball of clay, about the ſize of a cricket-ball, nearly an inch in thickneſs, perfectly ſmooth within, and about 20 inches under ground. The man who firſt diſcovered it, not knowing what it was, ſtruck the ball with his ſpade, by which means it was broken to pieces, or the ball alſo would have been preſented to me. The drawing will perfectly ſhew how the animal is laid during its dormant ſtate. How long it had been under ground it is impoſſible to ſay; but as I never could obſerve theſe animals in any parts of the country after the beginning of September, I conceive they lay themſelves up ſome time in that month, or beginning of October, when the froſt becomes ſharp; nor did I ever ſee them again before the laſt week in May, or beginning of June. From their being enveloped in balls of clay, without any appear-

appearance of food, I conceive they ſleep during the winter, and remain for that term without ſuſtenance. As ſoon as I conveyed this ſpecimen to my houſe, I depoſited it, as it was, in a ſmall chip-box, in ſome cotton, waiting with great anxiety for its waking; but that not taking place at the ſeaſon they generally appear, I kept it until I found it begin to ſmell: I then ſtuffed it, and preſerved it in its torpid poſition. I am led to believe its not recovering from that ſtate aroſe from the heat of my room during the time it was in the box, a fire having been conſtantly burning in the ſtove, and which in all probability was too great for reſpiration. I am led to this conception from my experience of the Snow Bird of that country, which always expires in a few days (after being caught, although it feeds perfectly well) if expoſed to the heat of a room with a fire or ſtove; but being nouriſhed with ſnow, and kept in a cold room or paſſage, will live to the middle of ſummer.

The animal above deſcribed belongs to Schreber's genus of *Dipus*, and may be characteriſed

DIPUS CANADENSIS,

palmis tetradactylis, plantis pentadactylis, caudâ annulatâ undique ſetoſâ corpore longiore.

Tab. viii. *Fig.* 5. repreſents the *Dipus canadenſis*, of its natural ſize, in an erect poſition.

Fig. 6. ſhews it in a torpid ſtate.

XI. *Ob-*

XI. *Obſervations on the Flowering of certain Plants. By the Rev. Thomas Martyn, B.D. F.R.S. V.P.L.S. Regius Profeſſor of Botany in the Univerſity of Cambridge.*

Read July 4, 1797.

THE improvements in the phyſiology of plants, ſince the days of Malphigi and Grew, have by no means kept pace with thoſe which have been made in the nomenclature, and in the aſcertaining of genera and ſpecies by accurate characters, deſcriptions and figures, under Linnæus and his followers. The reaſon is obvious: in order to aſcertain a plant, it is only neceſſary to ſee and deſcribe it once or twice in its ſtate of greateſt perfection; but we are not likely to become acquainted with the internal ſtructure and functions of vegetables, till a ſeries of accurate experiments ſhall have been gone through; or with their life, actions and manners, if we may ſo ſpeak, till we have got together a fund of laborious reſearches and obſervations. And there are very few perſons who can ſacrifice all the numerous calls of buſineſs or pleaſure, to beſtow a conſtant and regular attention to one object, and to become almoſt as ſtationary as the plants they are obſerving. Even the following obſervations, which are almoſt too trifling to offer for the conſideration of the Linnæan Society, required a regular attention ſeveral repeated times morning and evening during upwards of ſix weeks.

The

The three plants (*Anagallis arvenſis*, *Oenothera biennis*, *Hibiſcus trionum*) which were ſelected for theſe obſervations, were taken rather for the convenience of their ſituation, from their vicinity to the houſe, than for any other reaſon. *Anagallis arvenſis*, however, is a delicate wild plant, that has long ſince attracted notice, as indicating rainy weather or a moiſt atmoſphere by the cloſing of its flowers, and the contrary by their opening. Hence its name among the country people, of *Shepherd's* or *Poor man's weather-glaſs*. And *Oenothera biennis* has been generally regarded, from an early period, for the regular opening of its flowers in the evening, and has thence obtained the name of *Evening* or *Nightly Primroſe*.

The flowers of the *Oenothera* are collected in a very cloſe corymbus at the top of the ſtalk till the time of flowering. The upper flowers expand firſt; and as they expand ſucceſſively, the ſtalk is advancing in height, and ſeparating the flowers; inſomuch that when the flowering time is paſt, there is the ſpace of a foot or eighteen inches interpoſed between thoſe flowers which were originally contiguous. Whilſt each flower is preparing for expanſion, the peduncle gradually diverges from the ſtem, and, before the flower opens, arches downwards like a ſwan's neck: the corolla ſwells out at bottom, and is very apparent there between the leaflets of the calyx, which keep it cloſe together for a conſiderable time at top, by means of the hooks at the extremity of the calycine leaflets, till at length the corolla burſts its bonds inſtantaneouſly, opens to a certain point, and then having made a ſtand for a few ſeconds, expands very ſlowly to its full extent. This critical moment is very intereſting to the botanical obſerver, and may be ſeen with eaſe and pleaſure between ſix and ſeven within the houſe, by gathering the flowers and ſetting them in water. In hot weather the flowers grow

grow flaccid, and wither before noon the next day; but in cool and cloudy weather they will laſt two days.

The flowers of *Hibiſcus trionum*, when once expanded, continue open till they cloſe finally. They then droop; and when the corolla is withered and fallen, the peduncle again becomes erect. In warm weather the corolla folds up wholly at night, and decays on the ſecond day; but in cool weather it will laſt a day or two half folded up, but never opening ſo as to ſhow the rich purple eye at its baſe.

The height of the barometer and thermometer, with the ſtate of the weather on each day, are given with a view of aſcertaining whether there be any connection between them and the time in which the flowers open.

The barometer was obſerved between 8 and 9 A. M. and the thermometer at the ſame time, and again about 3 P. M. The latter inſtrument was within the houſe, but in a hall, the door of which was commonly open, and not at all expoſed to the ſun.

Obſervations on the Opening and Cloſing of the Flowers of Anagallis arvenſis, Oenothera biennis, Hibiſcus trionum, *&c. during the Autumn of* 1796.

	Barom.	*Therm.*	*Weather.*	*Obſervations.*
Aug. 16.	$29\frac{9}{10}$	66°	Dry, ſunſhine and clouds alternately. Wind N. E.	Hibiſcus trionum open from 8 to 4.
17.	$29\frac{9}{10}$	61 to 64	The ſame, only more cloudy.	Hibiſcus trionum open from 8 to 4.
18.	$29\frac{9}{10}$	61 to 64	The ſame, morning covered.	Hibiſcus trionum open from 10 to 4.
19.	$29\frac{7}{10}$	62 to 66	The ſame, but warmer.	Hibiſcus trionum open from 9 to 4.
20.	$29\frac{7}{10}$	62 to 68	Fog, ſoon cleared, hot.	Hibiſcus trionum open from 9 to 4.
21.	$29\frac{6}{10}$	64 to 70	Clear, hot. Wind E.	Hibiſcus trionum open from 8 to 4.
22.	$29\frac{13}{20}$	64 to 71	The ſame.	Hibiſcus trionum open from 8 to 4.

	Barom.	*Therm.*	*Weather.*	*Obſervations.*
Aug. 23.	29 7/10	65 to 71	Clear, hot. Wind E.	Anagallis arvenſis open from 9 to 3. Apargia hiſpida cloſed at 12. Hibiſcus trionum 8 to 4.
24.	29 7/10	63 to 70	The ſame.	Anagallis arvenſis 10 to 3. Apargia hiſpida 8 to 12. Hibiſcus 8 to 3.
25.	29 6/10	63 to 68	Fog, cleared before 10. Wind S. W.	Anagallis 10 to 3. Oenothera biennis open at 7 p.m. Bellis perennis ſhut at 7 p. m. Hibiſcus 8 to 2½.
26.	29 7/10	65 to 69	Light clouds and airs. Wind S. W. Great clouds at noon, announciug a diſtant ſtorm. Flowers not affected by it. Afternoon very cloudy, with a ſprinkling of rain. Heavy rain and wind at night.	Anagallis 10 to 2. Oenothera 7 p. m. open. Bellis 7 p. m. ſhut. Hibiſcus 8 to 4.
27.	29 8/10	63 to 71	Wind N. N. W. Cloudy with ſunſhine. Windy afternoon. A ſhower at 2 P. M.	Anagallis 9½ to 2. Oenothera 6 p. m. open. One flower of Hibiſcus not ſhut at 6 p. m.
28.	29 6/10	61 to 63	Windy, clear morn, N. W. Cloudy at 10. Very cloudy the reſt of the day, Wind N. Evening clear.	Hibiſcus 9½ to 4. Anagallis half open at 12, quite open at 1, cloſed before 2. Oenothera 7 p. m. open
29.	29 11/10	60 to 62	Wind N. Light clouds and flying ſhowers. N. E.	Hibiſcus open 9 to 5. Anagallis 8 to 3. Oenothera 7 p. m. open. Some flowers of Hibiſcus not finally cloſed at 7.
30.	29 6/10	61 to 62	Wind N. E. Cloudy, windy. Rain at 2. Afternoon and evening wet.	Hibiſcus 9½ to 4. but never fully opened. Anagallis not open. Oenothera 7 p. m. open. Flowers of the 27th only flaccid; of yeſterday contracted, but not flaccid.
31.	29 6/10	60 to 61	Wind E. covered. Windy with ſome wet.	Hibiſcus 9 to 4. Anagallis 11 to 1, but never perfectly expanded. Oenothera 6½ open. Flowers of the 28th not withered till 9 a. m. this day.
Sept. 1.	29 5/10	60 to 62	Wind N. W. Clear with ſome flying clouds and wind. More cloudy towards afternoon.	Hibiſcus and Anagallis not open. Oenothera 6½ open.
2.	29 5/10	59 to 62	Sunſhine, with white clouds, Wind E. N. E. Dry all day.	Hibiſcus 9½ to 4. Anagallis 12 to 2. Oenothera 7 p. m. open.

	Barom.	*Therm.*	*Weather.*	*Observations.*
Sept. 3.	29 $\frac{4}{10}$	59 to 63	Sunshine, with white clouds, Wind N. W. Fine weather with much sun till evening; then very cloudy. Gentle rain in the evening.	Hibiscus 9 to 4½. Anagallis only half open at noon. Oenothera 6 p. m. open. Hibiscus 9½ to 5. Anagallis 11 to 3. Oenothera 7. p. m. open.
4.	29 $\frac{5}{10}$	60 to 62	Gentle rain in the morning. Wind W. N. W. Cloudy all day and warm.	Hibiscus 9½ to 5½. Anagallis half open at noon for a little time. Oenothera 6½ p. m.
5.	29 $\frac{11}{10}$	60 to 62	Wind W. Covered, with heavy clouds. Sun appeared about 1, and the afternoon continued fair.	Hibiscus 10½ to 6½, but never fully open. Anagallis 11 to 2, but not quite open. Oenothera 7 p. m.
6.	29 $\frac{5}{10}$	60 to 63	Wind W. Covered, windy. Afternoon very cloudy, with strong wind.	Hibiscus 9½ to 4½. Anagallis 10 to 2½. Oenothera 7 p. m.
7.	29 $\frac{7}{10}$	61 to 63	Wind W. Heavy rain in the morning; afterwards fair; evening very clear.	Hibiscus 12 to 6. Anagallis 1½ to 3. Oenothera 7 p. m.
8.	29 $\frac{5}{10}$	59 to 71	Clear sunshine. Wind W.	Hibiscus 9½ to 6. Anagallis 10 to 3. Oenothera 6 p. m.
9.	29 $\frac{6}{10}$	62 to 66	Covered, but sun appears before 10. Wind W. Clouds.	Hibiscus 8½ to 5. Anagallis 10 to 3. Oenothera 6 p. m.
10.	29 $\frac{11}{10}$	62 to 68	Morning clear sunshine. Wind S. W. Cloudy. Evening covered.	Hibiscus 8½ to 4½. Anagallis 9¼ to 3. Oenothera 6½ p. m.
11.	29 $\frac{11}{10}$	65 to 67	Wind S. W. Covered. A shower. Clear at noon and the whole day after.	Hibiscus 8½ to 5½. Anagallis at 10½ half open. Quite open from 12 to 3. Oenothera 6½ p. m.
12.	29 $\frac{7}{10}$	63 to 67	Wind W. S. W. White clouds. Heavy clouds at noon. Fair all day.	Hibiscus 8½ to 5. Anagallis 9½ to 2½. Oenothera 6½ p. m.
13.	29 $\frac{7}{10}$	61 to 68	Wind S. W. Strong dew. Morning clear; cloudy before 10. White clouds all day.	Hibiscus 8½ to 5½. Anagallis 10 to 2½. Oenothera 6½ p. m.
14.	29 $\frac{6}{10}$	63 to 69	Wind W. S. W. Heavy clouds and sunshine.	Hibiscus 8 to 4½. Anagallis 9½ to 2½. Oenothera 6¼ p. m.
15.	29 $\frac{5}{10}$	65 to 68	Wind W. S. W. Heavy clouds and wind. Fair all day.	Hibiscus 8¼ to 4. Anagallis 9¾ to 2¾. Oenothera 6¾ p. m.
16.	29 $\frac{6}{10}$	66 to 68	Wind W. S. W. Covered. Heavy clouds with some wind. Fair all day.	Hibiscus 8 to 5. Anagallis 9 to 2. Oenothera past 7.
17.	29 $\frac{11}{10}$	64 to 73	Wind W. S. W. Clouds with sunshine and wind.	Hibiscus 8½ to 4½. Anagallis 9½ to 2¾. Oenothera 6¾ p. m.

Sept.

	Barom.	*Therm.*	*Weather.*	*Observations.*
Sept. 18.	29 $\frac{1}{10}$	66 to 68	Wind S. W. Covered. Still. Small ſhowers.	Hibiſcus 8$\frac{1}{2}$. Anagallis 10 to 1$\frac{3}{4}$. Oenothera paſt 7.
19.	29 $\frac{8}{10}$	63 to 66	Wind E. Covered. Gentle rain in the morning. Very moiſt all day.	Hibiſcus and Anagallis not open. Oenothera paſt 7.
20.	29 $\frac{2}{10}$	64 to 66	Wind S. S. W. Heavy clouds. Rain at 4.	Hibiſcus 9 to 5. only half open. Anagallis 12 to 2$\frac{1}{2}$, half open. Oenothera 6 p. m.
21.	29 $\frac{1}{10}$	64 to 67	Heavy rain. Clearer at $\frac{1}{2}$ af. 10. Wind W. S. W. Sunſhine, with heavy white clouds.	Hibiſcus 12$\frac{1}{2}$ to 6. Anagallis 1 to 2$\frac{1}{2}$ but never quite open. Oenothera 6$\frac{1}{2}$.
22.	29 $\frac{1}{10}$	62 to 63	Strong dew. Still E. N. E. Heavy clouds with ſunſhine. Covered at noon.	Hibiſcus 10 to 5, half open. Anagallis 10$\frac{1}{2}$ to 1$\frac{1}{2}$, half open. Oenothera after 7.
23.	29 $\frac{4}{10}$	60 to 63	Wind E. Covered.	Hibiſcus and Anagallis not open. Oenothera after 7.
24.	29 $\frac{4}{10}$	59 to 61	Wind E. Covered. Still.	Hibiſcus and Anagallis ſcarcely open. Oenothera after 7.
25.	29 $\frac{4}{10}$	59 to 61	Wind E. Covered. Windy. Some rain in the evening.	Hibiſcus ſcarcely open. Anagallis not open. Oenothera 6 p. m.
26.	29 $\frac{4}{10}$	59 to 61	Wind N. E. Windy with rain.	Hibiſcus and Anagallis not open. Oenothera after 7.
27.	29 $\frac{6}{10}$	59 to 61	Wind E. Windy. Light clouds with ſunſhine. Covered at noon.	Hibiſcus ſcarcely open. Anagallis at 11, half open.
28.	29 $\frac{13}{20}$	58 to 59	Wind E. Covered.	Nothing open.
29.	29 $\frac{7}{10}$	57 to 59	Wind N. E. Strong dew. Morning clear, but covered before noon.	Hibiſcus not open. Anagallis half open at 11.
30.	29 $\frac{8}{10}$	56 to 59	Wind N. E. Morning clear, afterwards great white clouds.	Hibiſcus 12 half open. Anagallis 11 to 3 quite open.
Oct. 1.	29 $\frac{13}{20}$	55 to 56	Wind N. W. Covered. Sun broke out at noon.	Hibiſcus not open. Anagallis 11$\frac{1}{2}$ to near 2.

After this to the 13th the barometer ſunk to $\frac{3}{10}$ and $\frac{1}{10}$. The thermometer varied from 50 to 58. The wind was chiefly W. to W. N. W. The weather was moſtly covered and windy. And the flowers did not open.

XII. *Remarks on ſome Foreign Species of Orobanche. By James Edward Smith, M. D. F. R. S. P. L. S.*

Read October 3d, 1797.

THE Britiſh ſpecies of *Orobanche* have till lately been very ill underſtood, and it appears upon examination that the foreign ones ſtill require elucidation. The very firſt ſpecies in Linnæus, *Orobanche lævis*, when put to the teſt of botanical criticiſm, is found to be a non-entity; its hiſtory having been fabricated, partly from ſynonyms which belong to *Orchis abortiva*, and partly from thoſe of a real *Orobanche*, which however Linnæus never knew, and which does not anſwer to the name or character of his ſuppoſed *lævis*.

The original authority for the *Orobanche lævis* is the firſt edition of *Species Plantarum*, p. 632, where it is taken up entirely from other authors, who have deſcribed it as being found near Montpellier, of which place Linnæus accordingly gives it as a native, nor does he mention its being known in any other country. He had no ſpecimen from thence in his collection, though he had then before him a ſpecimen of a Siberian plant, figured in the *Flora Sibirica* of Gmelin, (who ſent it to Linnæus,) *vol.* iii. *tab.* 46. *fig.* 2, as an *Orobanche*, which Linnæus ſuſpected might be the ſame with the Montpellier ſpecies, and therefore marked it *lævis*, with a mark of interrogation, as it ſtill remains in his herbarium. It anſwers indeed

deed to the ſpecific definition of *lævis, caule ſimpliciſſimo* lævi, *ſtaminibus exſertis*; but there is no reaſon to believe that definition was made from the contemplation of this ſpecimen, rather than from the ſynonyms and figures quoted in the *Species Plantarum*: and as Linnæus never farther deſcribed the ſpecimen, nor referred to Gmelin, neither did he ever mention Siberia as the native country of his *Orobanche lævis*, this can never be taken for ſuch, even though there ſhould prove to be no other exiſting, as we now hope to demonſtrate; more eſpecially as this Siberian ſpecimen proves a *Lathræa*, having a monophyllous quadrifid calyx, and the true habit of that genus.

In order clearly to underſtand the hiſtory of this miſtaken ſpecies, the *Orobanche lævis*, it is neceſſary to analize its ſynonyms chronologically. We begin therefore with

OROBANCHE magna purpurea monſpeſſulana. *Bauhin's Hiſt. Plant.* vol. ii. p. 782.

This plant is evidently taken up by John Bauhin from Lobel, in whoſe *Icones*, p. 269, we find two figures. The firſt repreſents, I think unqueſtionably, though rudely, the *Orchis abortiva* of Linnæus, and is marked *Orobanche major e Gramuntio luco Monſpellienſium.* The ſecond exhibits a true *Orobanche*, and is marked *Orobanche quarta.* Now it appears that the deſcription of John Bauhin belongs to the firſt of theſe plants, though he, or his editor, has by miſtake annexed to that deſcription a copy of the ſecond figure. Whether the deſcription be taken from any of Lobel's other publications, I have not been able to determine, nor is that point of any conſequence; it is ſufficient that it agrees altogether with the *Orchis* above mentioned, and not with any *Orobanche*, the flowers being deſcribed "like thoſe of an *Orchis* with ſhort ſpurs, and the root like the upper part of that of an *Orchis*, but without any *teſticuli* or bulbs."

Bauhin

Bauhin juſtly cenſures Lobel's figure, as wanting the ſpurs; he alſo enquires whether this plant may not be what Cluſius mentions in his *Hiſtoria*, as "a plant like his *Pſeudo-leimodoron*, but much paler, found in the wood of Gramont, and ſeveral other woods about Montpellier." There can be no doubt of the *Pſeudo-leimodoron* of Cluſius, *Hiſt. Plant.* 270, being the *Orchis abortiva*, though a figure of *Ophrys Nidus Avis*, by an error common in books with wooden cuts, is put for it *. The deſcription in that work is indeed copied from his *Stirpes Pannonicæ*, where the plant is named *Limodorum auſtriacum*, without any figure; and the paler variety, which he remembered to have ſeen formerly near Montpellier, is alſo there mentioned. I conſider therefore the deſcriptions of John Bauhin and Cluſius, and the firſt or left-hand figure of Lobel's *Icônes*, p. 269, as clearly belonging to *Orchis abortiva*, and having nothing to do with any *Orobanche*. With reſpect to the ſecond or right-hand figure of Lobel, copied into Bauhin's work by miſtake, it as indubitably, I think, repreſents the *Orobanche* lately publiſhed in *Tab.* 423 of *Engliſh Botany*, by the name of *cærulea*, which ſeveral authors there mentioned have taken for the Linnæan *lævis*: it cannot however remain, when the above errors are cleared away, as the true *lævis*, becauſe it is not in fact ſmooth, neither do the ſtamina project out of the flower; though Moriſon, in his copy of this figure, *ſect.* 12. *t.* 16. *f.* 2, has in one flower ſo repreſented them; for the compiling and copying tribe of authors are ſure to add ſomething every now and then to the general ſtock of error, how little ſoever they may ſupply to that of ſolid knowledge. The ſtyle indeed projects in Lobel's figure, and all its copies; the ſtem too is repreſented ſmooth, and the form of the corolla is very ill expreſſed: yet theſe figures can be deſigned for nothing elſe than our *O. cærulea*.

* Villars points out this error in his *Plantes de Dauphiné*, vol. ii. p. 40.

The

The next ſynonym in the *Species Plantarum*, that comes under conſideration, is that of Caſpar Bauhin:

OROBANCHE majore flore. *Bauhin. Pin.* 88.

This author quotes only the *Orobanche quarta* of Lobel's *Icones*, and an *Orobanche* of the *Hortus Eyſtetenſis*, a work I have not in my poſſeſſion. We muſt conclude that he intended the *Orobanche cærulea*, eſpecially as he has the *Orchis abortiva* in the preceding page, by the name of *Orobanche Monſpeliaca floribus oblongis*, under which he properly cites Lobel and Cluſius.

Moriſon's figure, mentioned above, is alſo referred to by Linnæus, in the ſame paragraph in which he quotes C. Bauhin. What this author has ſaid, p. 502, likewiſe refers to the *Orobanche cærulea*; and he rightly quotes another paragraph of Cluſius, who, in his *Hiſtoria*, p. 271, in a ſlight and ſuperficial way mentions having ſeen the ſame plant growing in corn-fields at Montpellier, upon common thiſtles.—Moriſon has the *Orchis abortiva* in the ſame plate with the above, *fig.* 4, and, in p. 502 of his letter-preſs, copies John Bauhin's account of it as an *Orobanche*. He deſcribes this very plant over again, *p.* 503, *n.* 19, but without a figure.

The only remaining ſynonym in the *Species Plantarum* is that of Sauvages, from his *Methodus Foliorum*, which is an arrangement of the Montpellier plants, both wild and cultivated, according to their leaves:

OROBANCHE caule ſimplici cæruleo bracteis brevibus. *Sauv. Meth.* 4.

This author quotes John Bauhin only; and as he has the *Orchis abortiva* in the ſame page, under the name of *Limodorum*, there can be

no doubt of his having, in the paragraph above referred to, intended the *Orobanche cærulea*, though he either did not read, or did not attend to, Bauhin's deſcription. He has moreover a repetition of *Orchis abortiva*, *p.* 23, *n.* 114.

I beg leave to conclude with a reference to one original author at leaſt, who really ſtudied and underſtood the plants he enumerated, as well as the books he quoted, Magnol in his *Botanicum Monſpellienſe.*

This writer, *p.* 195, evidently deſcribes the *Orchis abortiva* by the name of *Orobanche magna purpurea Monſpeſſulana*, I. B, referring alſo to Lobel and Cluſius. He mentions having often gathered the plant in the wood of Gramont in April and May, and juſtly criticiſes the figures of the above authors. "The lower lip of the flower in Cluſius's figure," he obſerves, "is cloven, which is not the caſe in the Montpellier plant." This figure I have already pointed out as repreſenting the *Ophrys Nidus Avis.* Magnol farther remarks, that "the figure of Bauhin is faulty, there being no proportion between the ſtem and flowers; and that it is a copy of the *Orobanche quarta* of Lobel. The figure of Lobel," he adds, "would have been better if the roots had been drawn as in that of Cluſius, and the flowers repreſented with ſhort ſpurs."—From all this there can be no queſtion about the plant of Magnol; and Gouan, though he quotes him under *Orobanche lævis*, *Hort. Monſp.* 308, expreſſes a ſuſpicion that he meant the *Orchis abortiva:* but neither of theſe writers, nor any following one that I can find, has hit upon the true cauſe of all the confuſion that has enveloped the plants in queſtion, which is John Bauhin's having copied one figure of Lobel for the other. Magnol has our *Orobanche cærulea*, *p.* 196, by the name of *Orobanche ſubcæruleo flore, ſive ſecunda Cluſii;* and mentions having

having often found it, in the month of May, in graſſy places near the ſea—the very ſituation in which it occurs in Norfolk. Gouan very erroneouſly refers to this ſynonym of Magnol as belonging to *Orobanche ramoſa*. The *Botanicum Monſpelienſe* of Magnol being to the Montpellier botaniſts what Ray's *Synopſis* is to our Engliſh ones, they are neceſſarily ſuppoſed to know every plant it contains; and what they really do not underſtand, they refer to ſome other ſpecies as varieties, but too often on inſufficient grounds.

To contribute ſomething more towards the hiſtory of this confuſed genus of *Orobanche*, I ſhall add the characters of two foreign ſpecies not hitherto aſcertained. The Britiſh ones will ſoon be more fully elucidated than they have hitherto been, by the labours of the Rev. Mr. Sutton, a member of this Society. Our joint obſervations, particularly the characters we have diſcovered for diſcriminating the ſpecies, may perhaps be of uſe to botaniſts of other countries, who may make ſtill farther diſcoveries than we have made; ſo that in time a tolerably complete hiſtory of the genus may be obtained, for which we have ſcarcely materials at preſent ſufficient.

1. OROBANCHE *caryophyllacea.*

O. caule ſimplici, corolla inflata fimbriato-criſpa; labio inferiore laciniis obtuſis æqualibus, ſtaminibus intùs baſi hirſutis.

O. major. *Pollich Palatin.* v. ii. 200.

O. major, garyophyllum olens. *Bauhin. Pin.* 87.

Gathered on ſhrubby hills near Valcimara at the foot of the Apennines, in April 1787. *Tour on the Continent, vol.* ii. 308. *Linnæus received the ſame from Siberia.*

This has very much the habit of the *Orobanche major* of *Engl. Bot. t.* 421. and all other Britiſh authors, and has been ſo univerſally

confounded with it by foreigners, that it is utterly impoſſible to allot to each its proper ſynonyms, no botaniſt having as yet properly deſcribed the ſtamina, in which the true character reſides; much leſs do the figures of old authors lend any aſſiſtance towards this diſcrimination. I here quote Caſpar Bauhin, merely on account of his mentioning the clove-like ſmell: in his ſynonyms he appears to confound theſe two, and poſſibly ſeveral more ſpecies. We have no reaſon to think that Linnæus intended the one more than the other for his O. *major*, he having preſerved no Swediſh ſpecimen; but I have retained that name for the Engliſh plant, which is alſo the more common of the two throughout Europe. When ſome Engliſh writers tell us it has "a faint ſmell of cloves," I believe that remark has been made rather from regard to books than to nature; for the O. *caryophyllacea* has indeed not a *faint*, but a very ſtrong and fragrant ſmell of cloves when freſh, as I can witneſs; but I never met with any body who could perceive the leaſt degree of the ſame ſmell in any *Orobanche* found in Britain.

With reſpect to more modern ſynonyms of theſe two ſpecies, Villars in his *Plantes de Dauphiné*, vol. ii. 407, evidently appears to have known them both, but thought them one ſpecies; he having only been anxious to diſtinguiſh from them the O. *cærulea*, *Engl. Bot. t.* 423, about which indeed there can be no diſpute. Pollich's moſt excellent deſcription leaves no doubt of his O. *major* being my *caryophyllacea*; I have therefore quoted him without any heſitation. Haller under his No. 295 ſeems to have intended neither of theſe, but rather the O. *minor*, *Engl. Bot. t.* 422, except that he mentions the clove-like odour. He refers to Micheli, who publiſhed a little Italian work in octavo at Florence, in 1723, upon this *genus*, chiefly to indicate a method of extirpation. This book enumerates many varieties, among which probably our new ſpecies are all to be found.

The

The O. *minor* is the only one I have ever met with growing in ſuch ſituations, or in ſuch abundance as to be deemed a weed; and it attaches itſelf, as Haller obſerves, to the roots of *Diadelphous* plants, particularly clover. Gmelin in his *Flora Sibirica* mentions ſeveral varieties of what he took for O. *major*; but it is not poſſible to determine what they really are.

β Haller has recorded as a variety of his 295, a Swiſs *Orobanche*, of which a drawing had been ſent him, "with a very denſe conical ſpike, a very ſhort flower, and ſtyle projecting conſiderably out of it," which, he adds, "is ſo remarkable as to deſerve being reckoned a ſpecies, provided more ſpecimens could be diſcovered." This ſame plant is to be found in the Linnæan herbarium, gathered in eaſtern Pomerania by a Mr. Brunnemann, and very well preſerved. If a variety of any thing, it muſt be O. *caryophyllacea*, with which the ſtamina preciſely agree; nor does it differ from the other ſpecimens in my poſſeſſion, except in being more luxuriant, with a greater number of flowers in a younger, and therefore conical, ſpike, and in the corolla and ſtamina being not half ſo long as uſual, while the ſtyle protrudes conſiderably. The germen is ſmooth; ſtyle ſlightly pubeſcent, incurved, with a dark-coloured ſtigma; bracteæ, calyx, and diviſions of the corolla exactly as in the ſpecies to which I have ventured to refer it.

I have only to obſerve farther, that the *Orobanche caryophyllacea* agrees very nearly with O. *major* in habit and ſize, as well as the appearance of its flowers; but differs from the latter in having the three ſegments of the lower lip obtuſe, and much more fringed and curled. The germen alſo is entirely ſmooth, which in O. *major* is hairy in the upper part, and the ſtyle is much leſs downy than in that ſpecies. The moſt ſtriking mark, however, of O. *caryophyllacea* conſiſts in the lower part of the ſtamina, on the inſide, being thickly

clothed with hairs, whereas that part in O. *major* is always perfectly ſmooth. The ſtigma of O. *caryophyllacea* is brown or purpliſh; that of O. *major* yellow.

2. OROBANCHE *gracilis.*

O. caule ſimplici, corolla inflata; labio inferiore breviſſimo laciniis obcordatis inæqualibus fimbriato-criſpis; ſtaminibus ſtyloque piloſis exſertis.

Gathered in hilly paſtures at St. Orſeſe near Genoa, in July 1787.

I can meet with no ſynonyms for this ſpecies. It has a taller and more ſlender ſtem than O. *major*, and is upon the whole leſs pubeſcent. The bracteæ are ſhorter than the flower. Corolla the ſize of O. *major*, but the upper lip is of a dark or purpliſh colour, and leſs fimbriated or criſped than in that ſpecies. The lower lip is remarkably ſhort, in three obcordate fimbriated ſegments, of which the middle one is larger than the other two, and is connected at its baſe with the very prominent two-lobed palate of the flower. The ſtamina are ſlender, thinly clothed all over, as well as the ſtyle, with ſcattered hairs, and project out of the mouth of the flower. The germen is ſmooth. I do not recollect its having, when freſh, peculiar ſmell.

The O. *gracilis* has moſt affinity to the *minor* in ſome of its characters; but differs in its larger inflated corolla, ſhort lower lip, longer ſtamina and hairy ſtyle.

XIII. *A Deſcription of Five Britiſh Species of Orobanche. By the Rev. Charles Sutton, B. D. A. L. S. late Fellow of St. John's College, Cambridge.*

Read December 5, 1797.

FROM the deſire of exciting a more accurate inveſtigation and deſcription than has hitherto been made of the ſeveral ſpecies of *Orobanche*, both Britiſh and Foreign, I tranſmit to the Society a deſcription of thoſe which are found in the county of Norfolk: I ſhall premiſe only a ſhort obſervation or two upon their general habit and manner of growth.

The firſt thing that is apt to ſtrike us with reſpect to theſe plants, is, that they are *Paraſitic*; but they are not altogether ſo, like the ſeveral ſpecies of Epidendrum, Viſcum, &c. They acquire ſuſtenance and ſtability not only from the foſter-plants to which they are attached, but alſo, and that in no ſmall degree, from the ſoil, into which they ſend forth radical fibres.

All the ſpecies exhibit an ungraceful formality from the defect of leaves, and have their ſurface more or leſs beſet with minute pellucid glanduliferous hairs, which project perpendicularly from the ſtems, ſquamæ, bracteæ, calyces, corollæ, and are ſometimes found within the flowers, upon the very ſtamina and piſtilla: theſe, according to the remarks of Guettard, have each an articulation at the

the diſtance of about two-thirds from their baſe, and are tipped with a globular ſort of cup, bearing a viſcid gland: we may ſuppoſe them to be intended to carry off ſecretions, and to anſwer the purpoſes of leaves in performing the office of reſpiration, &c. It is to the volatility of theſe ſecretions that we are to attribute the difficulty of preſerving living ſpecimens for any length of time, and the harſh ungracious appearance they aſſume in an herbarium.

They emit no ſmell (I ſpeak of thoſe only which I am about to deſcribe), have an acrid aſtringent taſte, and are rejected by all kinds of animals, except the minuter tribes of *Cimices* and *Thripſes*.

They are acotyledons; for, when a ſeed has attached itſelf to the root of any living plant, to which it is ſuited by its nature to adhere, it ſwells into a pellucid ſquamoſe gem or bulb; and after throwing out around the point of adheſion ſeveral tender fibres, it puſhes up at once into a perfect plant, without any lateral lobes or cotyledons; developing firſt the ſquamæ and then the ſtalk, with a capitulum of flowers concealed by bracteæ, in form reſembling a young head of aſparagus: the flowers afterwards expand in ſucceſſion upwards, and the capitulum becomes a ſpike. See Tab. xvii. fig. 1 and 2. —Adanſon has claſſed this genus among his monocotyledons.

Notwithſtanding what has been ſaid of the banefulneſs of the *Orobanche*, that it deſtroys the plants which feed it, I have had no experience of the fact: to me it has ever ſeemed to

"Grow with their growth, and ſtrengthen with their ſtrength."

Dr. William Turner, one of our earlieſt and moſt judicious herbaliſts, has given us the following account of it: he calls it Choke-weed, and ſays, "It is called about Morpeth in Northumberland (the place of his nativity) Newe Chappel Flower, becauſe it

grewe in a chappel there, in a certaine place called Bottell-bankes, whereas the unlearned people dyd worſhyppe the image of St. Marye, and reckoned that the herbe grewe in that place by the vertue of that image.—Beſides it that Dioſcorides wryteth, I have marked myſelfe that this herbe growethe muche aboute the rootes of broome, y^e^ whych it claſpeth aboute with certaine lyttel rootes on everye ſide lyke a dogge holdying a bone in his mouth: notwithſtanding I have not ſeen any broome choked with this herbe, howebeit I have ſeen the herbe called three-leved graſſe or claver utterly ſtrangled, al the natural juice clene drawne oute by thys herbe."

It is not improbable that more than one ſpecies is included in this account, for which reaſon I have given the extract, and that the "Choke-weed" of the clover may be different from the "Choke-weed" of the broom, and that the "Newe Chappel Flower" diſtinct from both, may be a ſpecies not yet defined. Be this ſo or not, it will at leaſt be worth while to make further reſearches, and inveſtigate what may yet remain; in particular to make enquiry after that which Mr. Curtis ſpeaks of, on the information of Mr. Thomas White, as growing upon walls in Pembrokeſhire and the decayed floor of an old caſtle; for none of thoſe with which we are at preſent acquainted are found in ſuch ſituations.

* *Corollis Quadrifidis.*

1. OROBANCHE *major.*

Caule ſimpliciſſimo. Corollis quadrifidis, inflatis. Staminibus infernè nudis. Stigmate bilobo, lobis diſtantibus. Stylo ſupernè pubeſcente.

♀. *major*, caule ſimpliciſſimo pubeſcente, ſtaminibus ſubexſertis. *Curtis Fl. Lond. faſc.* 4. *tab.* 44.

O. *major*,

O. *major*, *Withering Bot. Arr. 3d edit. p.* 557.

O. *major*, ſtem ſimple, corolla inflated; its upper lip undivided; lower in three equal ſegments. Stamina ſmooth. Style downy. *Smith in Engl. Bot. tab.* 421.

Radix craſſa, carnoſa, interdùm bulboſa, perennis, paraſitica; radici lignoſæ *ſpartii ſcoparii*, et *ulicis uropæi* imprimis adhærens; radiculis ſimplicibus, fragiliſſimis inſtructa; plures emittens caules. *Caulis* ſimpliciſſimus erectus, carnoſus, angulatus, piloſus *, craſſitie digiti, altitudine pedali et ultra, ex luteo fuſcus, dilutè purpuraſcens, ſquamis lanceolatis ſparſis, ſub ſolo confertioribus. *Flores* ſpicati, piloſi, fuſci, interdùm purpuraſcentes, ſtigmatibus flavis; perſiſtentes rigidi, ſordidè-ferruginei. *Bracteæ* ſimplices, lanceolatæ, piloſæ, floribus interdùm longiores. *Calyx*, perianthium ſubæquale, piloſum, diphyllum, laterale foliolis profundè bifidis, laciniis acutis inæqualibus.—Variat perianthio monophyllo quadrifido a parte poſteriori uſque ad baſin partito. *Corolla* tubuloſa, quadrifida, piloſa, tubo ſurſum inflato, incurvo, dorſo ſubcarinato; faux valdè aperta; limbus bilabiatus obſoletè denticulatus; labium ſuperius fornicatum, obtuſum, integrum, parùm reflexum; inferius trilobum, lobis ferè æqualibus, acutis, planiuſculis, intermedia dependente. *Nectarium*, glandulæ † tres anticè germini inſertæ. *Stamina*, filamenta quatuor ſubulata, ſupernè piloſa, infernè omninò nuda, canaliculata plana, duo breviora lateribus, duo longiora anticæ parti tubi inſerta, decurrentia, apice recurva; antheræ didymæ, altero apice mucronatæ, ad-

* Si quas plantarum partes in his deſcriptionibus uno verbo *piloſas* vel *piloſiuſculas* dixero, pilos glanduliferos intelligat lector.

† Sic Curtis, & ſic amicus noſter accuratiſſimus D. Rob. B. Francis:—Ipſe autem nullum offendi.

hærentes,

hærentes,—defloratæ unà cum ſtylo exſertæ. *Piſtillum*, germen oblongum, nitidum, piloſiuſculum; ſtylus filiformis, piloſiuſculus, apice pubeſcens, purpuraſcens; ſtigma bilobum, lobis globoſis, flavis, diſtantibus, medio tranſversè rimoſum. *Pericarpium*, capſula ovato-oblonga, longitudinalitèr dehiſcens, unilocularis bivalvis; *Semina* minuta, numeroſa, ſubturbinata, reticulato-celluloſa. *Receptacula*, quatuor linearia lateralia, adnata.

Floret Junio. 4

Habitat in dumetis ſterilioribus, et in locis incultis—Thorp, Brook, Baconſthorp.

As this ſpecies has generally paſſed for O. *major*, and has been figured and deſcribed as ſuch by the authors of the *Flora Londinenſis* and *Engliſh Botany*, I have retained that trivial name, though it is now ſuſpected not to be that of Linnæus, nor the O. *major Garyophyllum olens*, ſo often mentioned, of C. Bauhin. Of the many ſynonyms to O. *major*, quoted by Reichard in his edition of the *Syſtema Plantarum* of 1780, vol. 3. p. 183, it is extremely difficult which to refer to our plant: we may ſafely however exclude thoſe from Bauhin *Pin.* 87.—Loefling, p. 151, original edition,—and Pollich, No. 600. Dr. Withering, in his 3d edition of the *Bot. Arrangement*, has judiciouſly excluded the long deſcription of Loefling. I dare not quote any of his ſynonyms, for want of ſufficient marks of diſcrimination: the figures he refers to in Morriſon xii. 16. 1. Gerard em. p. 1311, Cluſius i. p. 270, Dodonæus p. 552, and Lobel *Ic.* ii. 89, are copies of each other, and, if meant for our plant, are very bad repreſentations of it. J. Bauhin's ii. p. 780, is equally uncertain; that of Matthiolus p. 536, copied in *Gerard*'s *Herbal*, 1ſt edition, p. 1130, and that of *Tabernæmontanus*, p. 684, though not ſatisfactory, are a great deal better.

2. OROBANCHE *elatior. Tab.* 17.

Caule ſimpliciſſimo. Corollis quadrifidis. Staminibus infernè piloſis. Stigmate obcordato. Stylo ſupernè glabro.

Radix præcedentis, radici lignoſæ *Centaureæ Scabioſæ* et *Trifolii pratenſis* imprimis adhærens. *Caulis* præcedentis, ſed procerior. *Flores* longè ſpicati, piloſi, pallidè rubeſcentes, venis ſaturatioribus notati; ſtigmatibus flavis; perſiſtentes, rigidi, ſubcompreſſi, ferruginei—centum et plures in eâdem ſpicâ interdum numeravi. *Bracteæ* præcedentis. *Calyx*, perianthium abbreviatum, piloſum, monophyllum, quadrifidum, ponè uſque ad baſin partitum, laciniis lanceolatis, acuminatis, duabus poſterioribus divaricatis, longiuſculis; levitèr ſtriatum, ſordidè album, lineis dilutè rubris notatum. *Corolla* tubuloſa, quadrifida, piloſa; tubo cylindraceo recurvo; dorſo carinato; faux aperta; limbus bilabiatus, inæqualis, fimbriato-criſpus; labium ſuperiùs rotundatum, reflexum, integrum; inferiùs trilobum; lobis æqualibus, rotundatis. *Nectarium*, glandulæ quatuor nectariferæ ad baſin filamentorum, tubo inſertæ. *Stamina*, filamenta quatuor ſubulata, anticè glabra, nuda, poſticè ad baſin piloſa, pilis non glanduliferis, duo breviora lateribus, duo longiora anteriori tubi parti inſerta. *Antheræ* didymæ, altero apice mucronatæ, levitèr adhærentes; defloratæ unà cum ſtylo exſertæ. *Piſtillum*, germen ovatum, glabrum, nudum; ſtylus glaber, nudus; ſtigma bilobum, obcordatum, flavum, medio tranſversè rimoſum. *Pericarpium*, capſula ut congenerum. *Semina* rugoſa, ſeu obſoletè reticulata.

Floret Julio, Auguſto 4.

Habitat in agris *Trifolii pratenſis*, non in ſementis anno; et in marginibus

ginibus agrorum juxta *Centaureas ſcabioſam* et *nigram*, *Scabioſam arvenſem*, &c.—Gunton, Kelling, Sheringham, Catton, Coſteſey, in glareoſis.

This is no uncommon plant: it has hitherto been conſtantly confounded with the preceding; but though they are ſimilar in general appearance, the difference between them is very diſcernible on a cloſer inſpection; and they who acknowledge the force of that ſentiment of Linnæus, that "minimis partibus per totum naturæ campum certitudo omnis innititur, quas qui fugit paritèr naturam fugit*," will be ready to allow this to be a diſtinct ſpecies. There is reaſon to ſuppoſe it may have been noticed by Ray very early, though not particularly diſtinguiſhed by him; for in his *Hiſtoria Plantarum circa Cantabrigiam naſcentium*, printed in 1660, his firſt work in Botany, he ſpeaks of having found the O. *flore majore* of J. B. "in a field of barley, on the right hand of the way between Cambridge and Grantcheſter, alſo in a corn-field at Cherryhinton," places in which this is very likely to be found, as it grows among herbaceous plants, and never on the roots of broom or furze:—He adds, "alſo at Gamlingay, growing at the roots of broom plentifully:" here he undoubtedly means our O. *major*, for that is ſtill to be found there in abundance. In his *Catalogus Plantarum Angliæ*, publiſhed ten years afterwards, he notices them thus: "ad radices geniſtæ, interdum et inter ſegetes."

3. Orobanche *minor*.

Caule ſimpliciſſimo. Corollis quadrifidis. Staminibus infernè piloſis. Stigmate retuſo. Stylo ſupernè glabro.

* *Philoſophia Botanico*, p. 222. under the 280th aphoriſm: Fructificationis partes ſæpius conſtantiſſimas differentias ſubminiſtrant.

O. *major*, caule ſimplici, bracteis lanceolatis, flore majoribus. *Loeſl. Plantæ Hiſpanicæ rariores*, No. 35.

O. *major* β. minoribus floribus albidis, ſpicâ denſiore. *Haller Stirp. Helv.* 1 edit. p. 610.

O. flore minore, *R. Syn.* 3 edit. p. 288.*

O. *major* β *Hudſ. Flo. Angl.* 1 edit. p. 232 ?

O. *ramoſa* β *Hudſ. Flo. Angl.* 2 edit. p. 266 ?

O. *minor*. Stem ſimple. Corolla tubular; its upper lip undivided; lower in three curled ſegments, of which the middle one is lobed. Stamina ciliated. Style ſmooth.—*Smith in Engl. Bot.* tab. 422.

Radix priorum, ſquamis rarioribus; radici lignoſæ *Trifolii pratenſis* imprimis adhærens. *Caulis* 6—12 pollicaris, ſimpliciſſimus, erectus, teretiuſculus, piloſus, craſſitie ferè pennæ anſerinæ, incarnatus, interdum luteus, ſquamoſus, ſquamis rarioribus—caules plurimi interdum aggregati. *Flores* ſpicati, luteo-albidi, venis purpureis notati, piloſi—variant colore luteo;—perſiſtentes, rigidi, ferruginei;—flos inferior ſæpè pedunculatus. *Bracteæ* ſimplices, lanceolatæ, piloſæ, ferè longitudine florum. *Calyx*, perianthium ſubæquale, cauli concolor, piloſum, diphyllum, laterale, foliolis nunc bifidis; laciniis anguſtiſſimis inæqualibus; nunc ſimplicibus lanceolatis, integris, vel uno latere inciſis. *Corolla* tubuloſa, quadrifida, piloſa; tubo cylindraceo, patente, incurvo; dorſo carinato; faux aperta; limbus bilabiatus, inæqualis; labium ſuperiùs rotundatum, crenulatum, integrum; inferiùs trifidum, laciniis æqualibus, rotundatis crenulatis—variat intermediâ interdum trilobatâ. *Nectarium*, glandulæ quatuor crocatæ nectariferæ ad baſin filamentorum. *Stamina*, filamenta quatuor ſubulata, anticè glabra, nuda, poſticè piloſa, pilis non glanduliferis, duo breviora lateribus, duo longiora anteriori tubi parti inſerta.

Antheræ

Antheræ didymæ, altero apice mucronatæ—defloratæ unà cum ſtylo exſertæ. *Piſtillum*, germen ovato-oblongum, nudum; ſtylus filiformis, ſubnudus; ſtigma retuſum, margine dilatatum, purpureum, medio tranſverſè rimoſum, aliquando monſtroſum evadit triangulare vel quadratum. *Pericarpium*, capſula ut congenerum. *Semina* rugoſa, vel obſoletè reticulata.

Dignoſcitur prima facie—a præcedente, calyce diphyllo variabili;
—a majore, corollâ cylindraceâ;
—ab utrâque, corollâ minore.

Floret Julio, Auguſto, ♃ vel ♂.

Habitat in agris ad radices *Trifolii pratenſis*, non in ſementis anno; et in paſcuis inter *Hypochærin radicatam*, &c.—Sheringham, Weyborn, Eaton, Frettenham.

Having been favoured by the Preſident with a ſight of the plants in the Linnæan herbarium, it was with great pleaſure I found there one of this ſpecies: it was inſcribed by Linnæus, *Orobanche major*, and was given him by Loefling; moſt probably it was one of thoſe from the King of Spain's garden at Aranjuez, found at the roots of elms, which Loefling has deſcribed among his *Plantæ Hiſpanicæ rariores*. That it forms a diſtinct ſpecies there can now be very little doubt: the figure in *Engliſh Botany* is taken from one of my ſpecimens—it repreſents the calyx perfectly well, but not the ſtigmata. It is frequently to be found with a much longer ſpike; in which caſe the flowers are not only more numerous, but are much cloſer ſet than in the figure. From its growing ſo very copiouſly among clover, I am of opinion it is the ſame which Dr. Turner noticed as being ſo pernicious to it. None of the other old Herbaliſts have mentioned it, nor has it been introduced into any of our Britiſh Floras, if we except Hudſon, who is thought to have it in his

firſt

firſt edition of *Flo. Angl.*; but, from his uncertainty reſpecting it afterwards, it ſhould ſeem he took it upon truſt from Dillenius, rather than from any knowledge he himſelf had of it. Dillenius, in his edition of *Ray*'s *Synopſis*, ſpeaks of its being found in a field of oats near Rocheſter. It might poſſibly be not unknown to Ray. I am at leaſt inclined to think ſo, from a paſſage in his *Hiſtoria Plantarum*, vol. ii. p. 1227, where having deſcribed the O. majore flore J. B. he adds, "O. flore minore J. B. adeo parùm differt a præcedente ut ſpecie diverſum eſſe mihi perſuadere vix poſſum."

* * *Corollis quinquefidis.*

4. OROBANCHE *cærulea.*

Caule ſubſimplici. Corollis quinquefidis. Bracteis ternis. Calycibus tubulatis, ſemiquadrifidis.

O. *lævis*, caule ſimpliciſſimo, lævi, ſtaminibus exſertis. *Syſt. Plant. ed. Reichard. vol.* iii. *p.* 183.

O. *purpuraſcens*, caule ſimpliciſſimo pubeſcente ſtaminibus incluſis. *Syſt. Nat. ed. Gmelin*, p. 954.

O. *purpurea*, caule ſimpliciſſimo pubeſcente ſtaminibus incluſis. *Jacquin Flo. Auſt. tab.* 276.—Ibid. *enum. Vindob. Obſ.* 50.

O. caule ſimplici, ſtipulis ternatis, calyce quinquefido. *Haller Stirp. Helv. 2 edit.* No. 294.

O. floribus cæruleis laxè ſpicatis. *Gmelin Flo. Sib. vol.* iii. *p.* 215. *tab.* 46. *fig.* 1.

O. *cærulea*, caule ſimplici, baſi bulboſo, floribus numeroſis incurvis. *Villars Dauph. vol.* ii. *p.* 406.

O. *ramoſa* β. *Withering Bot. Arr.* 3 *edit. p.* 558.

O. *cærulea*. Stem ſimple. Corolla tubular; its upper lip cloven and notched, lower in three equal entire ſegments. Stamina ſmooth. Bracteæ three. *Smith in Engl. Bot. tab.* 423.

Radix

Radix ut congenerum; radiculis diverſarum herbarum radices complectentibus. *Caulis* 6—10 pollicaris, ſubſimplex, erectus, rigidus, piloſiuſculus, parùm flexuoſus, angulatus, ſublignoſus, ex luteo olivaceus, craſſitie pennæ anſerinæ vel cygneæ, ſquamoſus, ſquamis ovato-lanceolatis. *Flores* laxè ſpicati (ſpicâ obtuſiuſculâ), violacei, venis ſaturatioribus notati, levitèr piloſi, floribus *ramoſæ* affines ſed majores; perſiſtentes torti, compreſſi, cernui, fuſci—flos inferior ſæpè pedunculatus. *Bracteæ* ternæ calyci vix æquales, duæ laterales interiores lineari-lanceolatæ, intermedia exterior ovato-lanceolata, piloſæ, pilis brevibus. *Calyx*, perianthium monophyllum, cauli concolor, tubulatum, ſemiquadrifidum, laciniis æqualibus lanceolatis, acuminatis, piloſis, cum rudimento quintæ ad inciſuram profundiorem poſticam; interdum, ſed rarò, adeſt quinquefidum cum rudimento ſextæ poſticæ. *Corolla* ringens quinquefida, piloſa, calyce duplo longior, tubo infernè tereti, ſupernè ſensim ampliato, compreſſo-triangulari; dorſo acutè carinato, medio obtuſiuſculè incurvo; faux dehiſcens; limbus bilabiatus ſubæqualis; labium ſuperiùs bifidum, laciniis obtuſiuſculis, reflexis denticulatis, venis majoribus in dentes eductis; inferiùs trilobum, laciniis æqualibus acutiuſculis; palatum ſericeum, pilis ſcilicet albis, non glanduliferis, adpreſſis, tectum. *Nectarium* fruſtra quæſivi. *Stamina*, filamenta quatuor filiformia, nuda, glabra, vix recurva, duo breviora lateribus, duo longiora anteriori tubi parti inſerta. *Antheræ* luteo-albidæ, conniventes intra faucem—defloratæ incluſæ. *Piſtillum*, germen ovato-oblongum, nudum, læve; ſtylus filiformis, incurvus, piloſiuſculus; ſtigma capitatum, album, bilobum, nec rimoſum, faucem claudens. *Pericarpium*, capſula ovato-oblonga, medio ſulcata, longitudinalitèr dehiſcens. *Semina* minuta numeroſa, ſubturbinata, reticulato-celluloſa.

Floret Julio ♃.

Habitat

Habitat inter gramina, in paſcuis, et ad margines agrorum—Sheringham juxta mare, Beeſton, et Northrepps.

We are entered now upon a diviſion of the genus in which the ſpecies, beſides having the upper lip of the corolla divided, differ in many reſpects from thoſe in the laſt: the ſhape of the flower is no longer cylindrical; the ſtamina are ſhort and filiform, the ſtigma with no apparent tranſverſe fiſſure, the calyx tubular, the bracteæ ternate, and the plants altogether leſs ſucculent and perhaps leſs paraſitic. The character therefore being in general ſo different, and more obvious marks of diſcrimination preſenting themſelves in this diviſion, I preſume a ſmall deviation from the form of the ſpecific definitions before laid down may be allowed.

The ſtem in this ſpecies, though generally, is not always unbranched; the Rev. R. B. Francis of Holt has remarked to me, that, if mutilated, it will throw out lateral ſhoots; and I have obſerved, that this is not the caſe with any of the three foregoing ſpecies; for if the entire ſpike of any of them is broken off, even at an early period, the ſtem decays; and if great part of it only is broken off, the work of nature is carried on in perfecting the few flowers that remain, on elongated footſtalks.—From this circumſtance, and from having alſo ſeen a perfect ſpecimen that was branched towards the bottom, I have been induced to define this ſpecies *Caule ſubſimplici.*

The little that was known of it in England, till lately, was from Mr. Pitchford's ſpecimen found in 1779, and Mr. Lightfoot's (ſee *With. Bot. Arr.* p. 558, and *Engl. Bot.* p. 184.) Being moſt allied to the *ramoſa*, it was taken at firſt for a variety of it, and deſcribed as ſuch in Withering, though with a very incorrect reference to its *habitat.* In 1796 Mr. Scrimpſhire found ſeveral at Sheringham, and I found a few

a few at the adjoining pariſh of Beeſton, one of which I preſented to the Society in February laſt. It ſeems to have been more generally found abroad, where it has uſually paſſed for that unknown ſpecies of Linnæus, the O. *lævis*; a miſtake ariſing, as I have been convinced by the Preſident, from a wrong application of ſynonyms in the *Species Plantarum*.—See the preceding paper.

5. Orobanche *ramoſa*.

Caule ramoſo. Corollis quinquefidis. Bracteis ternis. Calycibus brevibus, profundè quadrifidis.

O. *ramoſa*, caule ramoſo, corollis quinquefidis.—*Syſt. Plant. ed. Reichard, p.* 184.—*Pollich Flo. Pal. n.* 601.

O. caule ramoſo, flore quinquepartito.—*Haller, 2 edit. n.* 296.

O. *ramoſa*, caule ſubramoſo, corollis quinquefidis.—*Hudſon Flo. Ang. 2 edit. p.* 266.

O. *ramoſa*. —*Raii Syn. 3 edit. p.* 288.* —*With. Bot. Arr. 3 edit. p.* 558.

O. *ramoſa*, ſtem generally branched, corolla with five ſegments. —*Smith in Engl. Bot. tab.* 184.

Radix congenerum, annua, vix ſquamoſa, *Cannabis ſativæ* radicibus cauleque imprimis implicita. *Caulis* 6—10 pollicaris, erectus, ſubflexuoſus, teres, piloſus, ſublignoſus, luteo-purpuraſcens, craſſitie ferè pennæ anſerinæ, baſi ramoſus, ramis caule brevioribus, ſquamoſus, ſquamis raris ovato-lanceolatis, citò fuſceſcentibus; interdum ſimplex. *Flores* ſpicati (ſpica acuta) ex albido cœrulei, venis cœruleis notati, piloſi; perſiſtentes declinati, tubo ſupernè compreſſo, infernè ventricoſiore, fuſci—flos inferior ſæpe pedunculatus. *Bracteæ* ternæ breves, calyci vix æquales, membranaceæ, citò fuſceſcentes, duæ laterales interiores, lanceolatæ acu-

minatæ, exterior ovato-lanceolata. *Calyx*, perianthium monophyllum, hyalinum, dimidio corollæ brevior, ſcilicet ad corollæ longitudinem in ratione 2 ad 5; latius et profundius ad poſticam quam ad anticam partem, ibique quam ad latera, inciſum; laciniis æqualibus, lanceolatis, acutis. *Corolla* ringens, quinquefida, piloſa, tubo infernè terete, ſupernè ſenſim ampliato, compreſſo-triangulari; dorſo carinato incurvo; faux dehiſcens; limbus bilabiatus inæqualis; labium ſuperius rotundatum, breviuſculum, bifidum edentatum, reflexum; inferius trilobum, laciniis æqualibus, rotundatis, porrectis. Palatum ex albido luteum, pilis albidis non glanduliferis barbatum. *Nectarium* nullum. *Stamina*, filamenta præcedentis, piloſiuſcula, purpuraſcentia. *Antheræ* luteo-albidæ, intra faucem tectæ,—defloratæ incluſæ. *Piſtillum*, germen quadrato-ovatum nitidum, piloſiuſculum; Stylus filiformis, incurvus, piloſiuſculus, purpuraſcens; Stigma retuſum, margine dilatatum, albidum, non rimoſum. *Pericarpium*, capſula quadrato-ovata, longitudinalitèr dehiſcens. *Semina* minuta numeroſa, ſubturbinata, reticulato-celluloſa.

Floret Auguſto, Septembri ☉.

Dignoſcitur a præcedente — Spicis acutis; caule et ramis parùm ſquamoſis; calycibus bracteiſque dimidio corollæ brevioribus; tubo poſt floreſcentiam infernè globoſo.

This ſpecies was firſt found in Norfolk, by Mr. Woodward, in the year 1785, in a hemp field at Brome. He found it again, ſome time afterwards, in a ſimilar ſituation, on the oppoſite ſide of the river at Metingham, near Beccles, in Suffolk—the place where it is reported to have been found, in the time of Dillenius, by Dr. James Sherard. It grows alſo among the hemp at Outwell, in Norfolk. The ſeeds of both were probably introduced into England together.

In

Orobanche elatior.

In the *Botanical Arrangement* it is ſaid to be found "in corn-fields and dry paſtures;" and in the *Species Plantarum*, "in ſiccis." We have known it found in no other than a very rich, light, and moiſt ſoil. It may be doubted whether the O. *ramoſa* of Oſbeck, p. 58 of the original edition, and p. 78 of the Engliſh tranſlation, be the ſame ſpecies with ours, or not.

EXPLANATION OF TAB. XVII.

Fig. 1. Repreſents a root of the *Trifolium pratenſe* in the ſecond year of its growth.

2. An embryo plant of *Orobanche minor*, attached firmly by its centre, which is a yellow pellucid *gem*, covered with a few ſquamæ, to the root of the Trifolium, and throwing out fibres of a browniſh colour into the ſurrounding ſoil.

3. A young plant juſt riſen to a capitulum, covered above the ſurface of the earth with pellucid glanduliferous hairs.

4. *Orobanche elatior*, in its natural ſize.

a. The ſpike.

b. That part of the ſtem which is found below the ſurface of the earth. Note—*a* and *b* are not correſpondent parts. The intermediate part, which connects the bottom of *a* with the top of *b*, needs no figure for explanation; it is uſually about the length of *b*.

c. Part of the root of *Centaurea ſcabioſa*.

d. The corolla expanded.

e. One of the ſtamina.

f. The anthera magnified.
g. The piſtillum.
h. The ſame ſomewhat magnified.
i. A part of the corolla in the form of a ſquama frequently remaining attached to the germen.
j. The calyx.
k. The bractea.

XIV. *Ac-*

XIV. *Account, accompanied by a Figure, of a minute Ichneumon. By George Shaw, M. D. F. R. S. V. P. L. S.*

Read Nov. 7, 1797.

THIS accurate microſcopic drawing was made ſome years ago, of a ſpecies of *Ichneumon*, which may perhaps be the *Ichneumon atomos* of Linnæus, an inſect which in the *Syſtema Naturæ* is ſaid to be found at Upſal, and to be ſmaller than a common mite. Such was certainly the caſe with the inſect from which the figure was taken, and which, when living, was ſcarce to be perceived, except when in motion on the ſurface of the window on which it was diſcovered. It may be doubted, however, whether it be the *Ichneumon atomos* of the *Syſtema Naturæ*, ſince it did not appear to be varied with whitiſh, as there deſcribed, but to be rather of an uniform poliſhed black. The wings are beautifully irideſcent, and are edged with extremely long black hairs.

Its character (ſuppoſing it not to be the *Ichneumon atomos* of Linnæus) may be thus deſcribed:

ICHNEUMON *punctum.*

Ichneumon niger nitidus, alis iricoloribus, margine pilis longiſſimis nigris.

TAB. 18. *fig.* 1. repreſents the *Ichneumon punctum* highly magnified.

XV. *Deſcription of the Phaſma dilatatum. By Mr. John Parkinſon, F. L. S.*

Read Nov. 7, 1797.

THIS ſingular animal, which appears to be a ſpecies hitherto undeſcribed, is at preſent in the Leverian Muſeum. It is ſuppoſed to be a native of Aſia; and belongs to that tribe of inſects which Stoll has called by the title of Spectres, and which conſtitute a diſtinct genus from that of *Mantis*. The preſent ſpecies meaſures ſix inches and a quarter from the upper part or top of the head to the extremity of the abdomen. The whole animal is of a flattened form, more eſpecially on the abdomen, which meaſures about an inch and a half acroſs in its broadeſt part. The thorax is of an obtuſely rhomboidal form, the ſides ſloping each way from the flattiſh upper part. The whole thorax is not only edged with ſpines, but has alſo ſeveral very ſharp ones diſtantly ſcattered over its ſurface. The head riſes up backwards into an obtuſely conic ſhape, and has ſeveral very ſtrong and large ſpines or proceſſes. The abdomen is edged, almoſt throughout its whole length, with a continued ſeries of ſmall ſpines, to the number of five on the ſide of each individual ſegment: the extreme ſegments are without ſpines. The thighs, or firſt joints of the lower pair of legs, are in this inſect remarkably ſtrong, of a ſomewhat triangular ſhape, and beſet with

ſome

ſome ſtrong ſpines; but the tibiæ, or ſecond joints, are armed with far larger and ſtronger ones. The upper and middle pair of legs are of a nearly ſimilar ſtructure in proportion, but much leſs ſtrongly ſpined. The colour of all the legs is green, tinged with brown; the ſpines blackiſh. The general colour of the thorax, abdomen and head is now brown, but might probably have been of a greeniſh caſt in the living animal. The wings are ſcarcely larger than the elytra or wing-ſheaths, and ſeem originally to have been reddiſh, a tinge of that colour ſtill pervading ſome parts of the wings; the tips are green. Theſe wings are very ſtrongly veined with brown fibres. The wing-caſes are of a ſtrong opake green, and were doubtleſs more vivid in the living inſect. They have a great reſemblance to a pair of leaves. The mouth has four palpi, which are rather long; and under the mouth are ſituated two leaf-ſhaped organs, perhaps belonging to the action of that part. The antennæ are wanting, the firſt joints alone remaining. The abdomen is terminated by a kind of boat-ſhaped organ, the keel of which poſſeſſes a conſiderable ſpace beneath the abdomen, ſo that fewer ſegments appear on that part than above. The concavity of this organ is covered above by a terminal ſcale and bifid proceſs, conſtituting the tip of the abdomen on the upper part. On raiſing this valve, an *ovum*, nearly of the ſize of a pea, but of a more lengthened form, was diſcovered lying in the cavity beneath; and on inſpecting farther into the cavity of the abdomen, a great many more *ova*, exactly ſimilar, were found, to the number of five or ſix-and-twenty—ſome ſtill remaining in the upper part. Theſe eggs are of a ſlightly oblong ſhape, but flattened at one end: they are of a brown colour, and marked all over with numerous impreſſed points; and have on one ſide a mark or double-waved line, ſo diſpoſed as to repreſent a kind of croſs, as if curved on the ſurface: the flattened

end

end is ſurrounded by a ſmall rim or ledge, and ſeems to be the part which opens at the excluſion of the larva, ſince it readily ſeparates from the reſt. On immerſing ſome of theſe *ova* in warm water, and opening them, the included yolk, of a deep yellow colour, and of the appearance of a tranſparent gum, was diſcovered; and this, when burned, afforded the uſual ſmell of animal ſubſtances, but in ſome it was accompanied by a ſlight degree of fragrance. It is perhaps needleſs to obſerve, that theſe mature *ova* clearly prove the inſect to be in its complete or ultimate ſtate, and not in that of a larva.

TAB. 18. *fig.* 2. is an accurate repreſentation of the inſect in its natural ſize and colours.

Fig. 3. ſhews the boat-ſhaped organ on the lower ſide of the abdomen.

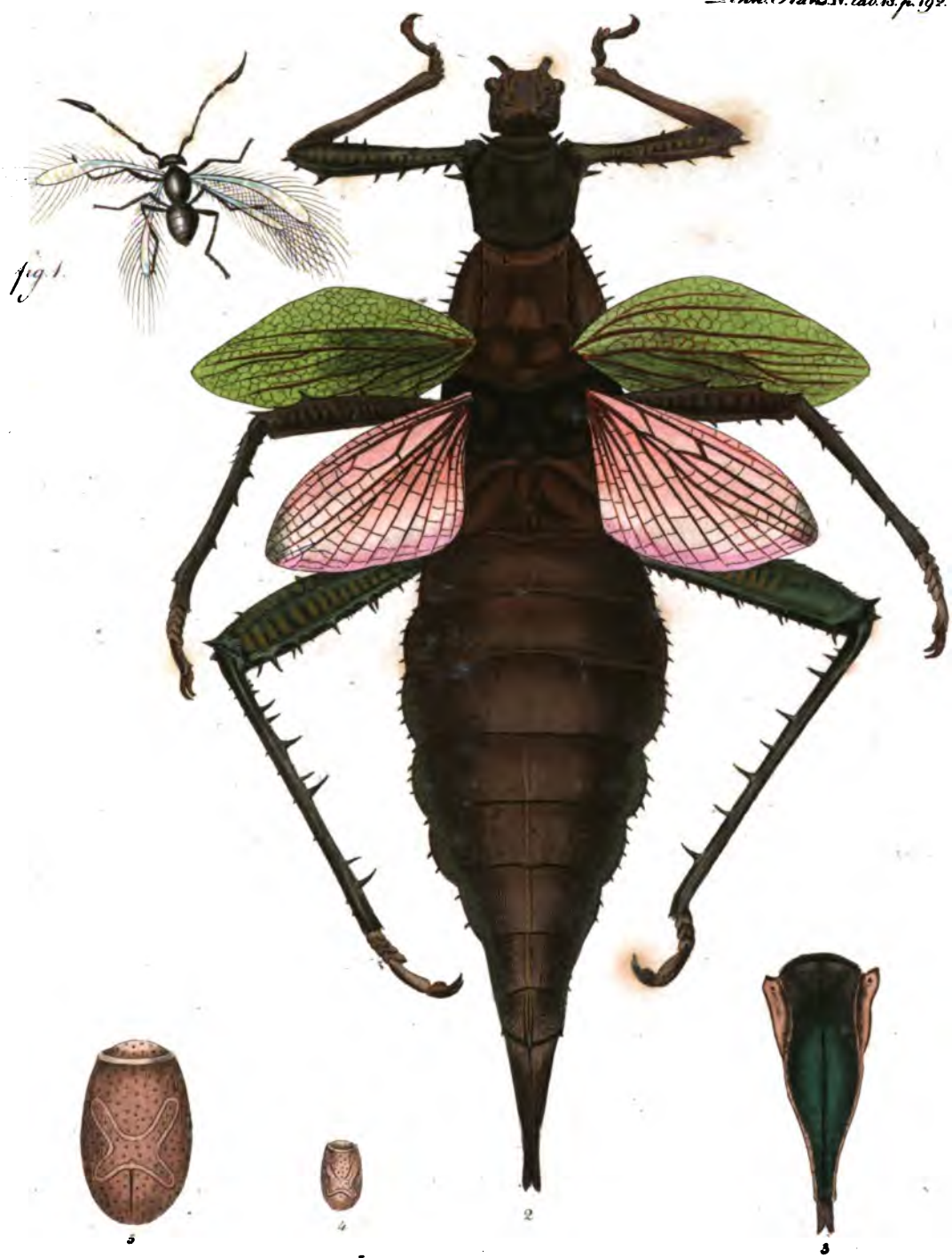
Fig. 4. repreſents an *ovum* in its natural ſize.

Fig. 5. the ſame magnified.

Dr. Shaw, who aſſiſted in the examination of the inſect, has thus given its ſpecific character, viz.

Phaſma dilatatum, thorace dilatato rhombeato pedibuſque ſpinoſis, abdomine lanceolato, lateribus ciliato-ſpinoſis.

Linn. Trans. IV. tab. 18. p. 192.



XVI. *Deſcription of the Blight of Wheat, Uredo Frumenti. By A. B. Lambert, Eſq. F.R.S. V.P.L.S.*

Read December 5, 1797.

THE wheat in the Weſt of England, eſpecially in the counties of Wilts and Somerſet, has of late years been very much injured, by what is called there the *Blight*, and generally ſuppoſed to be owing to an inſect. In the year 1797 the wheat was very much hurt by it, and a few years before there were ſeveral fields near Warminſter ſo much injured that the farmers were obliged to have it cut down long before it was ripe; for, as ſoon as a field is blaſted, as they call it, which happens ſometimes in a day and night, vegetation ſtops, and the only way to preſerve the crop from being entirely loſt is to reap it immediately.—I remember ſeeing a remarkably fine field of wheat, after one day's warm rain, look at a ſmall diſtance as if it were covered with ſoot, which I was informed was owing to inſects, but on examination I found to be a *Fungus*, which, no doubt, had been long ſown in the ſtem of the wheat, but wanted that kind of weather to occaſion its vegetation. The ſtem of the wheat where this *Fungus* appears is ſplit; and when a whole ſtem is almoſt covered with it, which is generally the caſe, it hinders the plant's growth.

I find the genus to which this *Fungus* belongs well deſcribed by

Perſoon, under the name of *Uredo*, in a work publiſhed by him, intitled, *Tentamen Diſpoſitionis Methodicæ Fungorum*, 1797, p. 13. "Pulvere farinaceo, thecâ orbato, ſub foliorum cauliumque epidermide effuſo, hâc demùm margine lævi ruptâ." In page 57, he deſcribes different ſpecies; but does not mention that I have obſerved, which I ſuppoſe to be a new one, and which I ſhall call

UREDO *Frumenti*, lineari-oblonga fuſco-nigricans.

It is always found on the ſtem of the wheat. The *Uredo ſegetum* of Perſoon, var. α Hordei, β Tritici, γ Avenæ, affects only the parts of fructification.

It is in wet ſeaſons that the wheat is the moſt injured by this *Fungus*, particularly what grows in low ground, as the crops on the hilly country are ſeldom hurt. I am informed it is only within theſe laſt twelve or fourteen years that it has been noticed in the Weſt of England, or at leaſt that the wheat has been known to be injured by it; and may it not proceed from the land being too much worked, and not having that reſt given it that it requires? Whether this cauſe might have firſt brought the diſeaſe, or whether it might ariſe from a want of a change of crops, I leave to thoſe to determine who are more in the way of making obſervations upon Agriculture than myſelf.

See a figure of this *Uredo* in Sowerby's *Fungi*, *vol.* 2. *tab.* 140.

XVII. *An-*

XVII. *Ammophila, a new Genus of Inſects in the Claſs Hymenoptera, including the Sphex ſabuloſa of Linnæus. By the Rev. William Kirby, F. L. S.*

Read December 5, 1797.

IN no department of the animal kingdom is the Divine Wiſdom more eminently conſpicuous, than in the conſtruction and œconomy of the inſect tribes; and amongſt theſe, none, perhaps, are more worthy of our attention, on both theſe accounts, than the individuals that compoſe the claſs *Hymenoptera*. Though they do not, like many of the *Coleoptera* and *Lepidoptera*, immediately attract our notice by the brilliancy or gaiety of their colouring (*a*), yet when we examine them cloſely, and obſerve the conſummate ſkill manifeſted in their conſtruction; when we attend to their hiſtory, replete, be they gregarious or ſolitary, with entertaining anecdotes, and furniſhing inſtances of the moſt aſtoniſhing ſagacity and moſt prudent precaution; we feel inclined to prefer the ſtudy of this order of inſects to that of any other, not only as moſt prolific of materials to ſet forth the praiſes of Him who hath created them, which is the firſt duty of the Naturaliſt—but alſo as gratifying, in a

(*a*) Some of them, however, are ſingularly beautiful even in this reſpect. Take for examples the *Tenthredo nitens*, many of the *Ichneumons* of Linnæus's laſt family, and the whole genus *Chryſis*.

high degree, our natural taſte for the inſpection of things that are remarkable either for their beauty, their ſtructure, or their uſes.

Amongſt the parts which diſtinguiſh this claſs of inſects from others, there is none more ſingular, both for its utility and conſtruction, than the tongue and the valves which incloſe and defend it: for this inſtrument is not confined to one or two genera, as ſeems to have been the opinion of Linnæus and the majority of Entomologiſts; but belongs, as I have reaſon to believe in conſequence of repeated diſſections of this part, to a very large majority of the claſs; although in ſome, on account of their diminutive ſize, it may not be viſible, unleſs the eye of the examiner be aſſiſted by a very ſtrong magnifier.

By means of this inſtrument the *Hymenoptera*, I apprehend, contribute very conſiderably towards the depuration of the air; for the ſweets which the flowers would exhale, were it not for myriads of theſe inſects, which feaſt upon their nectar during the ſummer and autumnal months (*b*), would probably render that element impure and unfit for reſpiration (*c*). I have heard of perſons that have been nearly ſuffocated by the odour of flowers placed in their bed-chamber.

This part, ſo important to theſe inſects, will furniſh, I feel perſuaded, a very appropriate character to diſtinguiſh many of the

(*b*) Hymenopterous inſects, eſpecially thoſe that are provided with a ſhort roſtrum, are moſt abundant upon umbelliferous plants. Upon theſe, particularly the *Daucus carota*, the Entomologiſt will find many of the rarer ſpecies of the ſplendid genus *Chryſis*.

(*c*) The wiſdom of Providence has not only been attentive to provide againſt the atmoſphere's being overloaded with ſweets; it has alſo uſed ſimilar precautions to prevent its being corrupted by exhalations of a contrary nature: and to effect this purpoſe, it employs an infinite number of inſects. (Which claſs of animals, in conjunction with the *Fungi*, may be called the depurators and ſcavengers of Nature). Witneſs the myriads to be found in their different ſtates in dung and all putreſcent ſubſtances.

genera

genera in the claſs, which are now very much confuſed. This perſuaſion is the reſult of an examination of what Fabricius terms the *inſtrumenta cibaria*, in order to fix upon an eſſential character, more determinate than the preſent, for the genus *Apis*. I found that the tongue was of one form in *Sphex*, of another in *Veſpa*, and of another ſtill in *Apis*. Amongſt the inſects which I diſſected with this view, was the *Sphex ſabuloſa* of Linnæus; and I was not a little ſurpriſed to find that it was furniſhed with an inflexed *roſtrum* (*d*), which concealed a long, retractile, tubular tongue, with a bifid *clava* at its end (*e*): whereas the tongue of true *Spheges*, ſuch at leaſt as I have examined, is very ſhort, flat, dilated, and nearly entire at the apex (*f*). It agreed with the tongue of *Veſpa*, in being divided at the end; but in this latter genus, that part is extremely ſhort and broad, obcordate, very deeply bifid, having its lobes ſometimes tipped with a ſmall callous point (*g*). It had a ſtill ſtronger affinity with that member in *Apis*, eſpecially in thoſe ſpecies that have an inflexed *roſtrum* (*h*), but in theſe the tongue is entire, and uſually acute. In many other circumſtances this inſect differs from all thoſe genera, as will appear when I give its natural character.

The poſſeſſion of three other Britiſh ſpecies, which agree with this in the peculiar form of the *roſtrum* and *maxillæ*, as well as in habit and other circumſtances, makes my heſitation the leſs to conſider them as diſtinct from the genus *Sphex*, and more particularly as Linnæus has placed an inſect exhibiting the ſame characters amongſt his *Apes*, under the name of *Apis Ichneumonea*. This will appear, I

(*d*) Tab. XIX. No. I. fig. 4. a. (*e*) fig. 3. (*f*) Tab. XIX. No. II. fig. 2.
(*g*) Tab. XIX. No. III. fig. 2. See alſo *Reaumur*, Tom. V. Tab. 16. fig. 2. and *De Geer*, Tom. II. Partie II. Tab. 26. fig. 10, 11.
(*h*) Tab. XIX. No. IV. fig. 2.

think,

think, evident to every one who conſults De Geer's figure of that inſect (*i*). Indeed that author deſcribes the roſtrum as having a different direction from that which is mentioned above (*k*), and which is obſervable in all my ſpecies of *Ammophila:* yet ſince he could have no opportunity of examining a recent ſpecimen, (this inſect being a native of South America,) he might very eaſily have been miſled in this point; for the roſtrum readily aſſumes and retains a direction outwards, although its natural poſition when at reſt is inwards.

It is ſingular that ſo attentive and accurate an obſerver ſhould have entirely overlooked this conſpicuous part in *Sphex ſabuloſa*, eſpecially as it had not eſcaped the notice of Linnæus.

I have given this genus the name of *Ammophila*, becauſe thoſe ſpecies with which I am acquainted frequent ſandy banks, particularly ſuch as are expoſed to the ſun.

This is nearly allied to ſeveral genera. The *Sphex ſabuloſa* one would take at firſt ſight for an *Ichneumon*, and Geoffroy (*l*) has ranked it under that genus. It has the antennæ, fierce port, and manners of *Sphex:* its bifid tongue connects it with *Veſpa*; and the inflexed direction and form of the valves of its roſtrum give it an alliance with a large number of *Apes*. On this account I would place it between the two latter genera.

Linnæus, in an admirable "*Methodus demonſtrandi lapides, vegetabilia, aut animalia,*" which I have ſeen at the end of ſome editions of his *Syſtema Naturæ*, under the article *Genus*, lays down the *Character naturalis* as a neceſſary part of it; although he has only given *natural characters* in his *Genera Plantarum*. Fabricius is the firſt Entomo-

(*i*) Tom. II. Partie II. Tab. 32. fig. 13—16.
(*k*) Mem. XII. p. 761.
(*l*) Tom. II. p. 349. n. 63.

logiſt

logiſt who has drawn out natural characters for inſects (*m*). To point out at firſt thoſe circumſtances in which all the individuals of a genus agree, is certainly extremely uſeful, and ſpares much unneceſſary tautology when we come to deſcribe them. I ſhall therefore follow his example upon the preſent occaſion.

AMMOPHILA.

Sandwaſp.

Character Naturalis.

Caput ſuborbiculatum, ſubdepreſſum. *Roſtrum* corneum, inflexum, ſubulato-conicum (*n*), *vaginâ* trivalvi; *valvulis* duabus ſuperioribus (*o*) ſemiſagittatis medio palpigeris, *palpis* ſexarticulatis; inferiori (*p*) apice biariſtatâ (*q*), *ariſtis* membranaceis; *palpis* duobus quadriarticulatis inſtructâ (*r*); *linguam* ſubmembranaceam, retractilem, tubuloſam, ſubclavatam, *clavâ bifidâ*, exerens (*s*). *Labium* inflexum. *Maxillæ* forcipatæ minaces, apice tridentatæ, dente interiori minimo, intermedio magno truncato, exteriore maximo acuminato (*t*). *Antennæ* filiformes, thorace breviores, ſæpiùs tredecim articulorum (*u*), medio frontis inſertæ (*v*). *Oculi* ovales, diſtantes. *Stemmata* in triangulum diſpoſita.

(*m*) Ego primus, in Entomologiâ, characteres naturales compoſui, introduxi, quibus omne ſyſtema niti debet. *Fabric. Philoſ. Entomol. Hamburg.* 1778, VI. § 28.

(*n*) Tab. XIX. No. I. fig. 4. a. (*o*) fig. 1. (*p*) fig. 2. c.

(*q*) fig. 2. dd. (*r*) fig. 2. e. (*s*) fig. 2. f. and fig. 3. (*t*) fig. 5.

(*u*) The three firſt joints of the antennæ differ in form from the reſt—The firſt, or *bulb*, is ſcarcely viſible without a magnifier, the ſecond is very large, and the third very ſmall. In one ſpecies they conſiſt of fourteen joints.

(*v*) fig. 6.

Collum

Collum infundibuliforme (*w*).

Thorax ſubcompreſſus ponè alarum inſertionem elongatus (*x*). *Scutellum* obſoletum.

Alæ planæ, venoſæ, *anaſtomoſi* obſoletâ.

Abdomen petiolatum glabrum, *aculeo* in fœminis recondito.

Pedes longi, graciles, ſetoſi (*y*). *Femora* apophyſibus biarticulatis inſidentia (*z*). *Tibiarum* poſticarum ſpinulæ interiores uno latere pectinatæ (*a*). *Tarſi* quinque-articulati.

Color niger, abdominis *cingulo* ferrugineo.

Many of theſe characters are peculiar to this genus, particularly the form of the *roſtrum*, *maxillæ*, *collum*, and the pectinated *ſpinulæ* of the poſterior *tibiæ*. Even *colour*, ſo various in other genera, in this ſeems characteriſtic. To the above marks it might be added, that, in all the ſpecies I am going to deſcribe, the under ſides of the poſterior *tibiæ* are covered with a ſhort pale down.

CHARACTER ESSENTIALIS.

Roſtrum conicum inflexum, linguam bifidam exerens.

Antennæ filiformes *in omni ſexu*, articulis ſubquatuordecim.

(*w*) Tab. XIX. No. I. fig. 7.

(*x*) That part of the thorax which is behind the wings, I believe I ſhall name upon a future occaſion the *Metathorax*, as it is ſeparated in hymenopterous inſects both from the thorax and ſcutellum by a ſuture, and in deſcriptions often requires diſtinct notice.

(*y*) Fig. 8. (*z*) Fig. 8. a.

(*a*) Fig. 10. I conjecture that this pecten is ſerviceable to the inſects of this genus in the excavation of the little burrows, where they depoſit the animal to which they have committed an egg. When with their hind legs they diſſipate (ruſpando) the little heap of ſand from the mouth of the burrow, which they had ſcratched with their fore ones from its bottom, this pecten will prevent the grains from paſſing between this ſpine and the baſe of the tarſus, which is alſo pectinated, although leſs viſibly. Fig. 9. a.

Oculi

Oculi ovales.
Alæ planæ.
Aculeus reconditus.

Theſe characters, I think, will ſufficiently diſtinguiſh our *Ammophila* from thoſe genera to which it is moſt nearly related. The direction of the roſtrum in this genus, the form of the eyes, and the plane ſurface of the wings, clearly prove it to be diſtinct from *Veſpa*. The bifid tongue, and the antennæ filiform in every ſex (*b*), ſeparate it from *Apis*. The direction and length of the roſtrum, and the bifid tongue, divide it from *Sphex*. The ſame part in conjunction with the number of articulations, and form of the antennæ, prevent its being confounded with *Ichneumon*.

SYNOPSIS SPECIERUM.

1. *Vulgaris*. A. antennis tredecim-nodiis, frontis foveâ inſertæ; abdominis petiolo elongato biarticulato, alis æquali.
2. *Affinis*. A. antennis tredecim-nodiis, frontis foveâ inſertæ; abdominis petiolo uniarticulato; alis corpore brevioribus.
3. *Hirſuta*. A. antennis tredecim-nodiis; abdominis petiolo uniarticulato brevi; alis corpus æquantibus.
4. *Argentea*. A. antennis quatuordecim-nodiis; abdominis petiolo uniarticulato; alis corpore brevioribus (*c*).

(*b*) In *Apis* the antennæ of the males are filiform, while thoſe of the other ſex are ſubclavate.

(*c*) This genus, as far as I am acquainted with the ſpecies that compoſe it, offers to the Entomologiſt the ſingular felicity of forming a *Diagnoſis Specierum*, from form, and the number and proportion of parts, without the neceſſity of having recourſe either to pubeſcence, or colour, for that purpoſe.

1. AMMOPHILA *vulgaris.*

Common Sandwaſp.

A. antennis tredecim-nodiis, frontis foveâ inſertæ; abdominis petiolo elongato biarticulato, alis æquali.

Sphex ſabuloſa, nigra, hirta; abdominis petiolo biarticulato; ſegmento ſecundo tertioque ferrugineis.

Linn. Syſt. Nat. ed. Gmel. i. p. v. n. 1.
Fn. Suec. 1648.
Fab. Ent. Syſt. Em. ii. Sphex n. 1.
Villars Ent. Eur. iii. n. 1.
Scop. Carn. n. 770.
Schrank Enum. Inſ. Auſt. n. 768.
Müll. Linn. Nat. cl. v. p. 864.
Faun. Fridr. 627.

Ichneumon niger, abdomine fulvo, poſticè nigro, petiolo longiſſimo.

Geoffr. Hiſt. ab. des Inſ. ii. p. 349. n. 63.

Gueſpe Ichneumon noire, à antennes filiformes, et à filet fort long, dont le devant du ventre eſt roux, et les ailes fort courtes.

De Geer ii. p^tie ii. p. 822. n. 5. tab. 28. fig. 7.
Friſch. Inſ. ii. tab. 1. fig. 6, 7.
Sulz. Inſ. tab. 19. fig. 120.
Schæff. Icon. tab. 83. fig. 1.
Donovan iii. tab. 93. fig. 1.

Habitat in terrâ ſabuloſâ, "*aprica*;" ubi canis inſtar pedibus anterioribus cuniculum fodit, larvamque phalænæ, vel araneam ſemimortuam in eo ſepelit, cui ovulum concredit: quo facto orificium terra claudit. *Linnæus.*

Caput punctulatum, ſubvilloſum villis ſordidi coloris.

Thorax ſordido-ſubvilloſus, linea intermedia longitudinali exaratus; *callis* (*d*), puncto ſub alas, et uno utrinque apud abdominis inſertionem, pilis decumbentibus ſericeo-argenteis ornatis. *Squamæ* nigræ (*e*).

Alæ ſubhyalinæ, apice obſcuriores, nervis nigricantibus, abdomine circitèr dimidio breviores, ſ. petiolum longitudine æquantes.

Abdomen clavatum; ſegmento primo filiformi nigro; ſecundo lineari, compreſſo, ferrugineo, puncto excavato utrinque notato; tertio campanulato ferrugineo; quarto nigro, baſi et infernè ferrugineo; reliquis nigris.

Long. corp. lin. 10.

β Variat minor, thoracis callis, lateribus, et poſticis pilis ſericeis deſtitutis; alis unicoloribus. An ſexus alter? forſan mas!

Long. corp. lin. 6.

This ſpecies, which is very common in Norfolk and Suffolk about ſandy banks of a ſunny expoſure; though rare, according to the ingenious Mr. Donovan, in the neighbourhood of London; is eaſily diſtinguiſhed from its congeners by the elongated *petiolus* of its abdomen, and its very ſhort wings. It may readily be known, even when flying, by the ſingular manner in which it carries its abdomen with the anus pointing upwards, ſo that it ſtands nearly at right-angles with that part of the thorax to which it is attached. The hiſtory of this inſect is very entertaining, as may be ſeen in De

(*d*) By the *Calli* I mean two little tubercles, one on each ſide of the anterior part of the thorax, to be met with in moſt hymenopterous inſects.

(*e*) The *Squamæ* are the minute ſemi-circular ſcales which cover and defend the root of the ſuperior wings, one over each.

Geer (*f*), whom I ſhall content myſelf with referring to; but I cannot reſiſt the temptation of tranſcribing from our great Ray, the very curious account he has given of ſome proceedings, of this very inſect, as I ſuſpect, which paſſed under his own obſervation. Theſe are his words (*g*): "Junii 22. an. 1667, è maximis hujus generi veſpam, ſpeciem jam non recordor, erucam viridem ſeipsâ triplo majorem trahentem vidi: quam poſtquàm, me præſente et ſpectante, ad unius circitèr perticæ noſtræ menſuræ, i. e. 15½ pedes, deportâſſet; propè orificium cuniculi, quem ſibi prius in terrâ excavaverat, depoſuit: deinde pilulâ terreâ, quâ prædictum orificium obturaverat, remotâ, ipſa prius in cavernulam deſcendit, et poſt parvam inibi moram aſcendit iterùm, erucamque, quam juxta foramen depoſuerat, apprehendens, ſecum in cuniculum devehit, eâque inibi relictâ, mox rediit ſola, globuliſque terreis aſſumptis, unam poſt alteram in cuniculum devolvit, et per intervalla pedibus anterioribus ruſpando (ut cuniculi aut canes ſolent) pulverem retrorſùm in foramen conjecit; idemque opus repetit cum pulvere aut pilulis alternatìm, donec cuniculus penitùs oppletus eſſet, ipſa aliquotiès deſcendente ad terram (ut mihi videbatur) deprimendam et denſandam; ſemèl etiam atque iterùm in pinum adſtantem evolante, ad reſinam fortè petendam terræ conglutinandæ, et operi conſolidando. Repleto foramine, et cum terræ ſuperficie coæquato, ut aditus amplius non poſſit diſcerni, duo pini folia adjacentia aſſumit, et juxta cuniculi orificium depoſuit, ad locum (ut veriſimile eſt) ſignandum. Quis hæc non mihi miretur et ſtupeat? Quis hujuſmodi opera meræ machinæ poſſit attribuere?" (*b*)

Scopoli,

(*f*) De Geer, tom. ii. p^tie ii. Mem. xiv.

(*g*) Raii Hiſt. Inſ. p. 254.

(*b*) I have been informed that the ingenious Mr. Curtis has written a hiſtory of this inſect,

Scopoli, as well as the great Linnæus, deſcribes the roſtrum as bivalve. I am loth to diſſent from ſuch high authorities; but I am convinced, from repeated examination, that the roſtrum in this and moſt hymenopterous inſects conſiſts of three valves beſides the tongue; two which cover its upper ſurface, and one that protects it beneath, to which it adheres (*i*).

I never was ſo fortunate as to meet with the variety of this inſect mentioned by Linnæus, *abdominis dorſo nigro*. It is poſſibly a diſtinct ſpecies. Villars, the ingenious author of the *Entomologia Europæa*, mentions another, *pedibus quatuor anticis fulvis*. I ſhould likewiſe think this more than a variety.

2. AMMOPHILA *affinis*.

Contiguous Sandwaſp.

A. antennis tredecim-nodiis, frontis foveâ inſertæ; abdominis petiolo uniarticulato; alis corpore brevioribus.

Habitat rarior in ericetorum ſabuloſis.

Caput punctatum, nigro ſubvilloſum. *Maxillæ* nigræ faſciâ mediâ fuſcâ.

Thorax nitidus, punctatus, lineolis quinque (quarum una intermedia) impreſſus. *Squamæ* fuſcæ, poſticè rufæ.

Alæ teſtaceæ, abdomine tertiâ parte breviores.

Abdomen (petiolo excluſo) lanceolatum; ſegmento primo filiformi nigro, ſecundo campanulato nigro, apice ferrugineo; proximis duobus ferrugineis; reliquis nigris.

Long. corp. lin. 9.

inſect, which was compoſed for a Society of which he was a member, before the Linnæan was eſtabliſhed; what comes from the pen of ſo learned and accurate a Naturaliſt, muſt be extremely valuable, and therefore I cannot help indulging a wiſh that the public may be put in poſſeſſion of this curious and intereſting paper.

(*i*) Tab. xix. No. i. ii. iii. iv. v. fig. 1, 2.

I took

I took two ſpecimens of this inſect upon the ſunny bank of a ſand-pit in Martleſham Heath near Woodbridge, in the beginning of laſt September, which was the only time I ever met with it. It is ſufficiently diſtinguiſhed from the A. *vulgaris*, by the uniarticulate ſtalk of its abdomen, the black *villi* that are ſcattered over its head and trunk, the five impreſſed lines that are viſible upon the diſk of its thorax, and by its wings, which are proportionably longer, and of a different hue: the maxillæ alſo are ſhorter, and have an obſcure reddiſh brown *faſcia* acroſs their middle; and the whole inſect is thicker in proportion. I do not find this ſpecies deſcribed in any author that I have an opportunity of conſulting.

3. AMMOPHILA *hirſuta.*

Hairy Sandwaſp.

A. antennis tredecim-nodiis; abdominis petiolo uniarticulato brevi; alis corpus æquantibus.

Sphex arenaria hirta nigra, abdominis petiolo uniarticulato, ſegmento ſecundo tertioque rufis; alis longitudine corporis.

Fab. Ent. Syſt. Em. ii. n. 2.
Linn. Syſt. Nat. ed. Gmel. i. p. v. Sphex 22.
Villars Ent. Eur. iii. — — — 7.

Sphex hirſuta nigra, capite thoraceque pubeſcentibus, abdomine anticè fulvo.—*Scop. Ent. Car.* n. 772.

—— nigra hirta, abdominis petiolo uniarticulato; abdomine medio ferrugineo; tibiis omnibus ſpinoſis.

Schrank Enum. Inſ. Auſt. n. 769.
Linn. Syſt. Nat. ed. Gmel. i. p. v. n. 53.
Villars Ent. Eur. iii. n. 16.

Capta ſemèl in foſſæ ripâ ſabuloſâ.

Caput

Caput magnum, punctulatum, atro-villosum. *Maxillæ* longitudine capitis valdè minaces. *Frons* planiuscula.

Thorax et pectus atro-villosa. *Squamæ* nigræ.

Alæ longitudine corporis subhyalinæ, apice nigræ, venis ferrugineis, costâ fuscâ.

Abdomen nigrum, lanceolato-ovatum; petiolo brevi villoso; segmento secundo, tertio, quartique basi, rubello-ferrugineis.

Pedes postici, abdomine dimidio longiores. *Tarsi* setis valdè asperi.

Long. corp. lin. 8.—Alt. Sex ? lin. 6½.

The larger specimen of this insect I purchased, as English, at a shop in Piccadilly; but the small one (which I believe to be the male) I took upon the sunny bank of a sandy ditch near Martlesham Heath, at the same time with A. *affinis*. I think that I have likewise seen it in the rich cabinet of our Secretary, my tutor in Entomology, and to whose liberality mine is indebted for some of its most valuable contents.

This insect is beyond a doubt the *Sphex arenaria* of Fabricius, and likewise the S. *hirsuta* of Scopoli and Schrank; although Gmelin and Villars make them different. It is clearly distinct from the two preceding species. Its wings of the length of the body, tipped with a black *nebula*; its abdomen of a figure inclining to ovate; its large head very villose, as well as its trunk; its maxillæ threatening with an immense acumen, plainly prove this. It is larger also in all its parts; the band which surrounds its abdomen is of a brighter red; the legs are much more bristly, especially the tarsi; and the interior spine, which arms the apex of each of the posterior tibiæ, is more conspicuously pectinated.

4. Ammo-

4. AMMOPHILA *argentea.*

Silver-fronted Sandwaſp.

A. antennis quatuordecim-nodiis; abdominis petiolo uniarticulato; alis corpore brevioribus.

Caput nigro-villoſum. *Maxillæ* acumine fuſco. *Antennæ* thoracis ferè longitudine. *Frons* planiuſcula, infrà antennas pilis denſis decumbentibus argenteo-nitidiſſimis, niſi à tergo vix conſpicuis, tecta.

Thorax anguſtus; ſubvilloſus uti pectus villis certo ſitu argenteis. *Squamæ* nigræ.

Alæ ſubhyalinæ, apice obſcuriores, nervis ferrugineis; abdomine dimidio ferè breviores.

Abdomen clavatum, ſegmento primo filiformi nigro; ſecundo campanulato tertioque rufis; quarto rufo, apice nigro; reliquis nigris.

Pedes ſetulis brevibus aſperi.

Long. corp. lin. $5\frac{2}{3}$.

Semèl capta, ſed ubi et quando neſcio.

At firſt ſight one would take this ſpecies for A. *vulgaris* β, but upon a nearer inſpection it will be found very diſtinct. The front has no *fovea*, and from the antennæ downwards is quite covered with a coat of ſilver pile, which, when the light falls upon it from above, gives it a very glittering appearance. From the midſt of this pile other longer black hairs, thinly ſcattered, ariſe. The antennæ conſiſt of fourteen joints, counting the minute one at their baſe. The *villi* of the trunk glitter in certain lights, but not ſo much as the pile on the front: the footſtalk of the abdomen conſiſts of a ſingle

ſingle joint, its belt is of a paler red, and the briſtles of the legs are very ſhort.

I have ſubjoined a ſketch which exhibits a comparative view of the *roſtra* and *maxillæ* in *Ammophila*, *Sphex*, *Veſpa*, and *Apis*; which will, I hope, though rudely executed, (for I cannot ſay "*anch' io ſon pittore*,") afford a tolerable idea of the marks and characters that ſeparate theſe genera.

I have no doubt of there being ſeveral foreign inſects, beſides A. *ichneumonea*, that belong to this genus (*k*): but as I have not at preſent an opportunity of examining the rich cabinets in the metropolis, I muſt defer ſaying any thing upon them till a future opportunity.

EXPLANATION OF TAB. XIX.

No. I.

The roſtrum, maxilla, and other parts of an *Ammophila* magnified.

Fig. 1. The outſide of one of the upper valves of the roſtrum, which is ſemiſagittate. (a) Its feeler of ſix joints.

Fig. 2. The under-ſide of the roſtrum exhibiting (a) the inſide of one of the upper valves. (b) Its feeler. (c) The under valve. (d d) Its ariſtæ, (e) One of its feelers of four joints. (f) The tongue.

Fig. 3. The under-ſide of the tongue viewed by itſelf, exhibiting (a) its bifid *clava*. (b) The orifice of its tube. (c) Its ſtalk.

Fig. 4. The under-ſide of the head, to ſhew the direction of the roſtrum when at reſt. (a) The apex of the roſtrum. (b) The neck.

(*k*) The inſect figured by De Geer, Tab. xxxii. fig. 17. belongs probably to this genus.

Fig. 5. A maxilla. (a) The inner tooth, generally acute. (b) The intermediate one, truncated. (c) The exterior one, acuminated. This acumen, croſſing that of the other maxilla, forms the forceps.

Fig. 6. The antennæ, conſiſting of thirteen joints. (a) The firſt joint. (b) The ſecond. (c) The third.

Fig. 7. (a) The neck. (b) The back part of the head. (c) The fore part of the thorax.

Fig. 8. A hind leg. (a) The apophyſis, conſiſting of two joints. (b) The thigh. (c) The tibia. (d) The tarſus, conſiſting of five joints.

Fig. 9. The firſt joint of the tarſus. (a) The pecten at its baſe.

Fig. 10. The interior pectinated ſpine at the apex of the poſterior tibia.

No. II.

The roſtrum and maxilla of a *Sphex* magnified.

Fig. 1. The outſide of one of the upper valves, ſhort and rounded, and hairy at the top. (a) Its feeler of ſix joints, the intermediate ones the largeſt.

Fig. 2. The under-ſide of the roſtrum. (a) The inſide of the upper valve. (b) Its feeler. (c) The under valve. (d d) Its minute ariſtæ. (e) Its feeler, of four joints. (f) The tongue, ſhort and dilated at the apex.

Fig. 3. The upper ſide of the tongue, on which it appears rather emarginate.

Fig. 4. A maxilla.

Fig. 5. The inſide of a maxilla, to ſhew the two obſolete teeth at the apex (a).

No. III.

The roſtrum and maxilla of a *Veſpa* magnified.

Fig. 1. The outſide of one of the upper valves, ſhort, hairy above the feeler, rounded at the top; below the feeler ſwelling out externally into the ſegment of a circle. (a) The feeler of ſix joints of nearly equal ſize.

Fig. 2. The under-ſide of the roſtrum. (a) The inſide of the upper valve. (b) Its feeler. (c) The under valve. (d) A fovea in its diſk. (e e) Two proceſſes analogous to the ariſtæ in No. I. and No. II. but tipped on this ſide with a callous point. (f) One of its feelers, of four joints. (g) The tongue, obcordate and bifid. (h h) Callous points at the tip of each lobe, obſervable on the under ſide only.

Fig. 3. The upper ſide of the tongue, tranſverſely ſtriated.

Fig. 4. A maxilla. (a) Two ſmall acute teeth. (b) One tooth large and truncated.

No. IV.

The roſtrum and maxilla of an *Apis*, *roſtro inflexo*, magnified.

Fig. 1. The outſide of one of the upper valves, lanceolate with a ſubinvolute acumen, and laterally emarginate. (a) The feeler, conſiſting of a ſingle joint.

Fig. 2. The under-ſide of the roſtrum. (a) The inſide of the upper valve. (b) The under valve. (c c) Its ariſtæ. (d d) The feelers, one at the apex of each ariſta, conſiſting of two joints. (e) Its linear tongue, ſubacute.

Fig. 3. The upper ſide of the tongue. (a) The top of it downy. (b) The lower part ſtriated.

Fig. 4. The maxilla, armed with two obtuſe teeth at its apex. (a) The interior tooth ſmall. (b) The exterior very large. N. B. The black lines are deſigned to repreſent the *ſulci*, which are drawn upon its exterior ſurface.

No. V.

Roſtrum and maxilla of an *Apis*, *roſtro reflexo*, magnified.

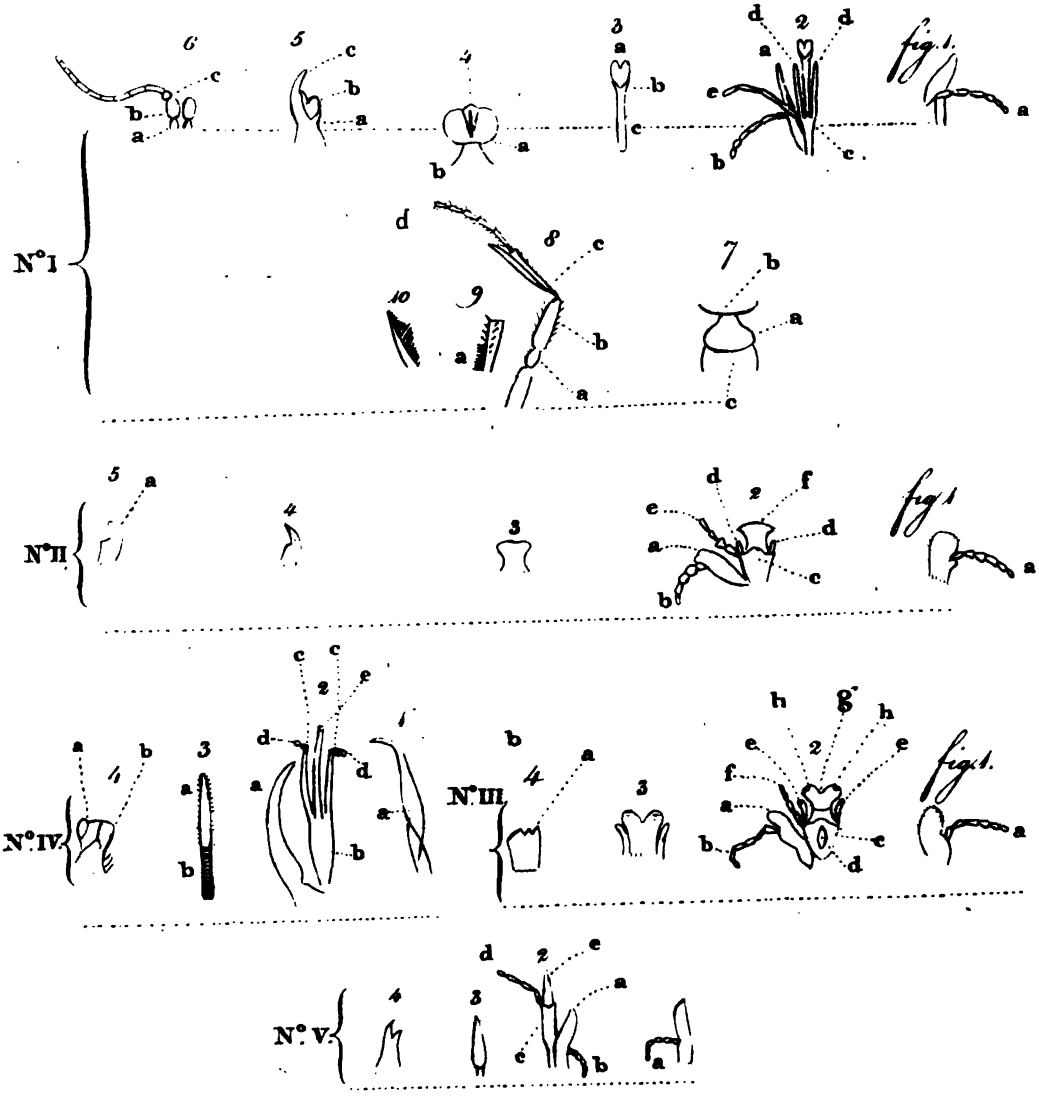
Fig. 1. Outſide of one of the upper valves, cultriform and acute. (a) Feeler of ſix joints.

Fig. 2. Under-ſide of the roſtrum. (a) Inſide of the upper valve. (b) Its feeler. (c) The under valve. (d) One of its feelers of four joints, the three laſt forming an angle with the firſt (*l*). (e) The tongue.

Fig. 3. The tongue ſeparate, linear-lanceolate, and very acute.

Fig. 4. The maxilla, armed at its apex with two unequal teeth, of which the interior is the ſhorteſt.

(*l*) With my pocket lens I could diſcover no part analogous to the *ariſta*, upon the under valve of this roſtrum.


N°I
N°II
N°III
N°IV.
N°V.
N°VI.
fig. 1.
fig. 2.

XVIII. *The Characters of Twenty New Genera of Plants. By James Edward Smith, M. D. F. R. S. P. L. S.*

Read February 6, 1798.

1. HÆMODORUM.

TRIANDRIA *Monogynia*, propè Wachendorfiam.

Ord. Nat. Iridibus affine, *Juſſ. Gen.* 59.

CHAR. ESSENT. *Petala* 6, tria interiora ſupra medium ſtaminifera. *Stigma* obtuſum. *Capſula* infera, trilocularis.

Herba facie *Corymbii*, glabra, inflorescentiâ corymbosâ, totâ puniceâ, exſiccatione nigrâ. A *Wachendorfiâ* differt germine infero, petalis apicem verſus ſtaminiferis, ſtaminibus abortivis nullis.

LOCUS *Auſtralaſia*.

2. CONOSPERMUM.

TETRANDRIA *Monogynia*, poſt *Proteam*.

Ord. Nat. Proteæ, *Juſſ. Gen.* 78.

CHAR. ESSENT. *Calyx* nullus. *Corolla* monopetala, ringens, ſtaminifera:

minifera: *labium* ſuperius fornicatum; inferius trifidum. *Stigma* obtuſum. *Semen* unicum, nudum, pappo coronatum.

Frutices rigidi, *Proteis* anguſtifoliis habitu affines. *Folia* ſimplicia, ſparſa. *Flores* ſpicati. *Corolla* irregularis. *Stamina* fauci inſerta, ad labium ſuperius adſcendentia. *Antheræ* 4, uniloculares; ſuperiores dorſo connatæ; laterales dimidiatæ. *Semen* obconicum, pappo radiante.

Locus *Auſtralaſia.*

3. XYLOMELUM.

TETRANDRIA *Monogynia*, propè *Bankſiam.*

Ord. Nat. Proteæ, *Juſſ. Gen.* 79.

CHAR. ESSENT. *Amenti* ſquama ſimplex. *Petala* quatuor, ſtaminifera. *Stigma* clavatum, obtuſum. *Capſula* unilocularis, diſperma. *Semina* alata.

Habitus omnino *Brabeji*; gaudet verò capſulâ ligneâ, apice hinc dehiſcenti, ſeminibus binis, alatis, nec *drupâ* amygdalinâ monoſpermâ. *Florum* plures, ſtigmate minori, abortiunt.

Locus *Auſtralaſia.*

4. LAMBERTIA.

TETRANDRIA *Monogynia.*

Ord. Nat. Proteæ, *Juſſ. Gen.* 79.

CHAR. ESSENT. *Calyx* communis polyphyllus, imbricatus, ſeptemflorus. *Petala* quatuor, ſtaminifera. *Stigma* ſubulatum, ſulcatum. *Capſula* unilocularis, diſperma. *Semina* marginata.

Frutex ramis virgatis, foliis ternis, apice mucronato-pungentibus.

Flores

Flores Proteæ melliferæ quodammodo ſimiles, ſaturatè roſei, formoſi. *Capſulæ* criſtatæ, tricornes.

Locus *Auſtralaſia.*

In honorem amici optimi *Aylmer Bourke Lambert*, S. S. Reg. et Linn. Socii, libelli de *Cinchonâ* auctoris, hoc novum dicavi genus.

5. CONCHIUM.

TETRANDRIA *Monogynia.*

Ord. Nat. Proteæ, *Juſſ. Gen.* 79.

CHAR. ESSENT. *Calyx* nullus. *Petala* quatuor, ſtaminifera. *Stigma* turbinatum, mucronatum. *Capſula* unilocularis, diſperma. *Semina* alata.

Frutices rigidi, foliis mucronatis, pedunculis unifloris, confertis, floribus albis, capſulis obliquis. Genus a *Xylomelo* differt ſtigmate mucronato, a *Bankſia* fructu unilocular, ab utrâque verò floribus calyce deſtitutis, nec amentaceis.

Locus *Auſtralaſia.*

6. PERSOONIA.

TETRANDRIA *Monogynia.*

Ord. Nat. Lorantho proximum genus.

CHAR. ESSENT. *Calyx* nullus. *Petala* quatuor, baſin verſus ſtaminifera. *Glandulæ* 4 ad baſin germinis. *Stigma* obtuſum. *Drupa* monoſperma.

Frutices ſubviminei. *Folia* exſtipulata, plerumque alterna. *Corolla* intus glabra. *Antheræ* lineares, demum reflexæ. *Stylus*

Stylus perſiſtens, glaber. *Drupa* in pleriſque edulis. *Flores* flaveſcentes.

Genus a *Lorantho* diſcrepat numero partium, calyceque nullo. Vix *Caprifoliis* Juſſieui aſſociandum.

Locus *Auſtralaſia.*

In memoriam celeberrimi *C. H. Perſoon*, opuſculis variis de *Fungis* præclari.

7. ZIERIA.

TETRANDRIA *Monogynia*, propè *Fagaram.*

Ord. Nat. Rutaceæ, *Juſſ. Gen.* 297.

CHAR. ESSENT. *Calyx* quadripartitus. *Petala* 4. *Stamina* glabra, glandulis inſidentia. *Stylus* ſimplex. *Stigma* quadrilobum. *Capſulæ* 4, coalitæ. *Semina* arillata.

Frutices foliis oppoſitis, ternatis, floribus albis. *Genus* dignoſcitur ſtaminibus ſingulis glandulæ magnæ inſertis.

Locus *Auſtralaſia.*

In memoriam piè defuncti *Johannis Zier*, Soc. Linn. quondam Sodalis, botanici indefeſſi, nobis non obliviſcendi, quamvis alio ſub nomine labores ejus ſæpiùs inclaruerint.

8. LASIOPETALUM.

PENTANDRIA *Monogynia*, propè *Iteam.*

Ord. Nat. Ericæ, *Juſſ. Gen.* 160.

CHAR. ESSENT. *Corolla* rotata, hiſpida, quinquefida. *Stamina* baſi ſquamâ munita. *Antheræ* poſticè bilobæ, apice poris duobus. *Capſula* ſupera, trilocularis, trivalvis; diſſepimentis e medio valvularum.

Planta

Planta paludosa, viminea, tomento ferrugineo stellato, præter foliorum paginam superiorem denudatam, tecta. *Folia* alterna. *Flores* racemosi, fusci, inamœni. *Calyx* 3- vel 5-phyllus. *Stylus* simplex. *Stigma* acutum. *Capsula* trigona.

Locus *Australasia.*

9. CRYPTANDRA.

Pentandria *Monogynia*, post *Azaleam.*

Ord. Nat. Rhododendra? *Juss. Gen.* 158.

Char. Essent. *Calyx* pentaphyllus. *Corolla* tubulosa, limbo quinquefido, squamis quinque, cucullatis, inter segmenta. *Stamina* fauce inserta sub singulis squamis. *Stigma* trifidum. *Capsula* supera, trivalvis, trilocularis e valvulis inflexis. *Semina* solitaria, compressa.

Fruticulus ericoides, foliis fasciculatis, floribus capitatis extùs setosis. *Semina* elliptica.

Locus *Australasia.*

10. VELLEIA.

Pentandria *Monogynia*, propè *Scævolam.*

Ord. Nat. Campanulaceæ, *Juss. Gen.* 165.

Char. Essent. *Calyx* triphyllus, inferus. *Corolla* tubulosa, supra hians, limbo quinquefido. *Capsula* quadrivalvis, uniloculàris, polysperma. *Semina* imbricata.

Genus *Goodeniæ* nostræ proximum, at differt *calyce* magno, *triphyllo*, infero! *capsulâ* quadrivalvi, *corolla* non usque ad basin fissâ. *Stigmate* gaudet *Goodeniæ*, habitu herbaceo, acauli.

Locus *Australasia.*

In honorem amiciſſimi D. *Thomæ Velley*, Soc. Linn. Sod. faſciculo de plantis ſubmarinis præclari.

11. STACKHOUSIA.

PENTANDRIA *Trigynia*, propè *Spatheliam*.

Ord. Nat. Terebintaceæ, *Juſſ. Gen.* 369.

CHAR. ESSENT. *Calyx* quinquepartitus. *Petala* quinque, unguibus coalita. *Capſula* tricocca, loculis monoſpermis.

Fruticulus vimineus, *Struthiolæ* facie, floribus flaveſcentibus, racemoſis, faſciculatis. *Folia* alterna, oblonga, integerrima, glauceſcentia. *Styli* breves. *Stigmata* obtuſa, ſimplicia. *Capſula* corrugata. Variat ſtylis binis, capſulâ dicoccâ.

LOCUS *Auſtralaſia*.

In honorem digniſſimi viri D. *J. Stackhouſe*, Soc. Linn. Sod. Nereidis Britannicæ auctoris.

12. SOWERBÆA.

HEXANDRIA *Monogynia*, antè *Allium*.

Ord. Nat. Aſphodeli, *Juſſ. Gen.* 53.

CHAR. ESSENT. *Corolla* infera, hexapetala. *Filamenta* tria, bantherifera, ſterilibus tribus interſtinctis.

Herba inodora, juncea, radice fibroſa. *Scapus* nudus. *Umbella* multiflora, bracteis ſcarioſis. *Petala* purpurea, perſiſtentia.

LOCUS *Auſtralaſia*.

In honorem viri amiciſſimi *Jacobi Sowerby*, Soc. Linn. Sod. botanici egregii, pictoris optimi, Fungorum Britannicorum ſcrutatoris acerrimi.

13. XAN-

13. XANTHORRHOEA.

HEXANDRIA *Monogynia*, propè *Anthericum*.

Ord. Nat. Aſphodeli, *Juſſ. Gen.* 52.

CHAR. ESSENT. *Corolla* infera, hexapetala, perſiſtens. *Filamenta* plana, linearia, nuda. *Capſula* triquetra. *Semina* bina, compreſſa, marginata.

Caudex lignoſus, reſinâ flavâ ſcatens. *Folia* triquetra. *Scapus* teres, longiſſimus, *amento* terminatus multifloro, floribus abortivis interſtinctis ſquamoſo.

LOCUS *Auſtralaſia*.

14. CORRÆA.

OCTANDRIA *Monogynia*, poſt *Ericam*.

Ord. Nat. Rhododendra, *Juſſ. Gen.* 159.

CHAR. ESSENT. *Calyx* monophyllus. *Petala* quatuor, conniventia. *Antheræ* incumbentes, biloculares, longitudinalitèr dehiſcentes. *Capſula* ſupera, quadrivalvis, quadrilocularis e valvulis inflexis. *Stigma* ſimplex, acutum.

Frutices foliis oppoſitis, ſimplicibus, pubeſcentiâ ſtellari, calyce campanulato, integro, denticulato, petalis in aliquibus connatis, corollam monopetalam ſimulantibus. *Beſaria* (meliùs *Bejaria*) Linnæi a *Corræâ* differt partium numero, at præcipuè antheris apice biporoſis, ſtigmate incraſſato ſeptemfido.

LOCUS *Auſtralaſia*.

In honorem amici optimi, botanici doctiſſimi, *Joſephi Correa*

de Serra, J U D, S S. Reg. et Linn. Sodalis, hoc novum et pulcherrimum dicavi genus, cùm *Correia* Vandellii *Ochnæ* ſpecies eſt.

15. GOMPHOLOBIUM.

DECANDRIA *Monogynia*, poſt *Sophoram*.

Ord. Nat. Leguminoſæ, *Juſſ. Gen.* 352.

CHAR. ESSENT. *Calyx* campanulatus, ſimplex, quinquepartitus. *Corolla* papilionacea. *Stigma* ſimplex, acutum. *Legumen* ventricoſum, uniloculare, polyſpermum.

Frutices foliis ternatis vel impari-pinnatis, floribus magnis, flavis.

LOCUS *Auſtralaſia*.

16. DAVIESIA.

DECANDRIA *Monogynia*, poſt *Gompholobium*.

Ord. Nat. Leguminoſæ, *Juſſ. Gen.* 352.

CHAR. ESSENT. *Calyx* angulatus, ſimplex, quinquefidus. *Corolla* papilionacea. *Stigma* ſimplex, acutum. *Legumen* compreſſum, monoſpermum.

Frutices rigidi, foliis ſimplicibus, pungentibus, floribus parvis, flaveſcentibus.

LOCUS *Auſtralaſia*.

In honorem clariſſimi *Hugonis Davies*, S. T. P. Soc. Linn. Sod. de plantarum Britannicarum ſtudioſis optimè meriti.

17. AFZELIA.

17. AFZELIA.

DECANDRIA *Monogynia*, propè *Hymenæam.*

Ord. Nat. Leguminoſæ, *Juſſ. Gen.* 347.

CHAR. ESSENT. *Calyx* tubuloſus, *limbo* quadrifido, deciduo. *Petala* quatuor, unguiculata; ſummo maximo. *Filamenta* duo ſuprema ſterilia. *Legumen* multiloculare. *Semina* baſi arillata.

Arbores foliis abruptè pinnatis, alternis, floribus racemoſis, ſanguineis, bracteolatis, leguminibus lignoſis, ponderoſis, ſeminibus nigris arillo coccineo ſpecioſis.

LOCUS *Africa æquinoctialis.*

Nomen dedi in inventoris honorem, celeberrimi *Adami Afzelii*, Botanices in Academiâ Upſalienſi Demonſtratoris doctiſſimi, qui hujus generis hiſtoriam abſolutiſſimam nobis pollicitus eſt. *Afzelia* Gmelini nimis incerta eſt ut tanto nomine condecoretur.

18. ERIOSTEMON.

DECANDRIA *Monogynia*, propè *Rutam.*

Ord. Nat. Rutaceæ, *Juſſ. Gen.* 297.

CHAR. ESSENT. *Calyx* quinquepartitus. *Petala* quinque, ſeſſilia. *Stamina* plana, ciliata; *antheris* pedicellatis, terminalibus. *Stylus* e baſi germinis. *Capſulæ* quinque, coalitæ, nectario toruloſo inſidentes. *Semina* arillata.

Fruticuli foliis alternis, floribus ſolitariis. Hujus generis eſt *Dioſma uniflora* Linnæi, cui ſtamina 5 abortiva ſunt. Differt a *Dioſmâ* defectu ſquamarum cum petalis alternantium; ſta-

minibus

minibus non exſertis; ciliatis, nec glabris; defectu nectarii germen coronantis; ſtaminumque numero.

LOCUS *Auſtralaſia.*

19. CROWEA.

DECANDRIA *Monogynia*, poſt *Erioſtemonem.*

Ord. Nat. Rutaceæ, *Juſſ. Gen.* 297.

CHAR. ESSENT. *Calyx* quinquepartitus. *Petala* quinque, ſeſſilia. *Stamina* plana, ſubulata, pilis intertextis connexa. *Antheræ* longitudinaliter filamentis e parte interiori adnatæ. *Stylus* e baſi germinis. *Capſulæ* quinque, coalitæ. *Semina* arillata.

Habitus præcedentis, abundè verò diſcrepat antherarum formâ ac ſitu.

LOCUS *Auſtralaſia.*

In honorem amiciſſimi D. *Jacobi Crowe*, Soc. Linn. Sod. qui Floram Britannicam ad unguem inveſtigavit, atque obſervationibus numeroſis vario in modo communicatis illuſtravit.

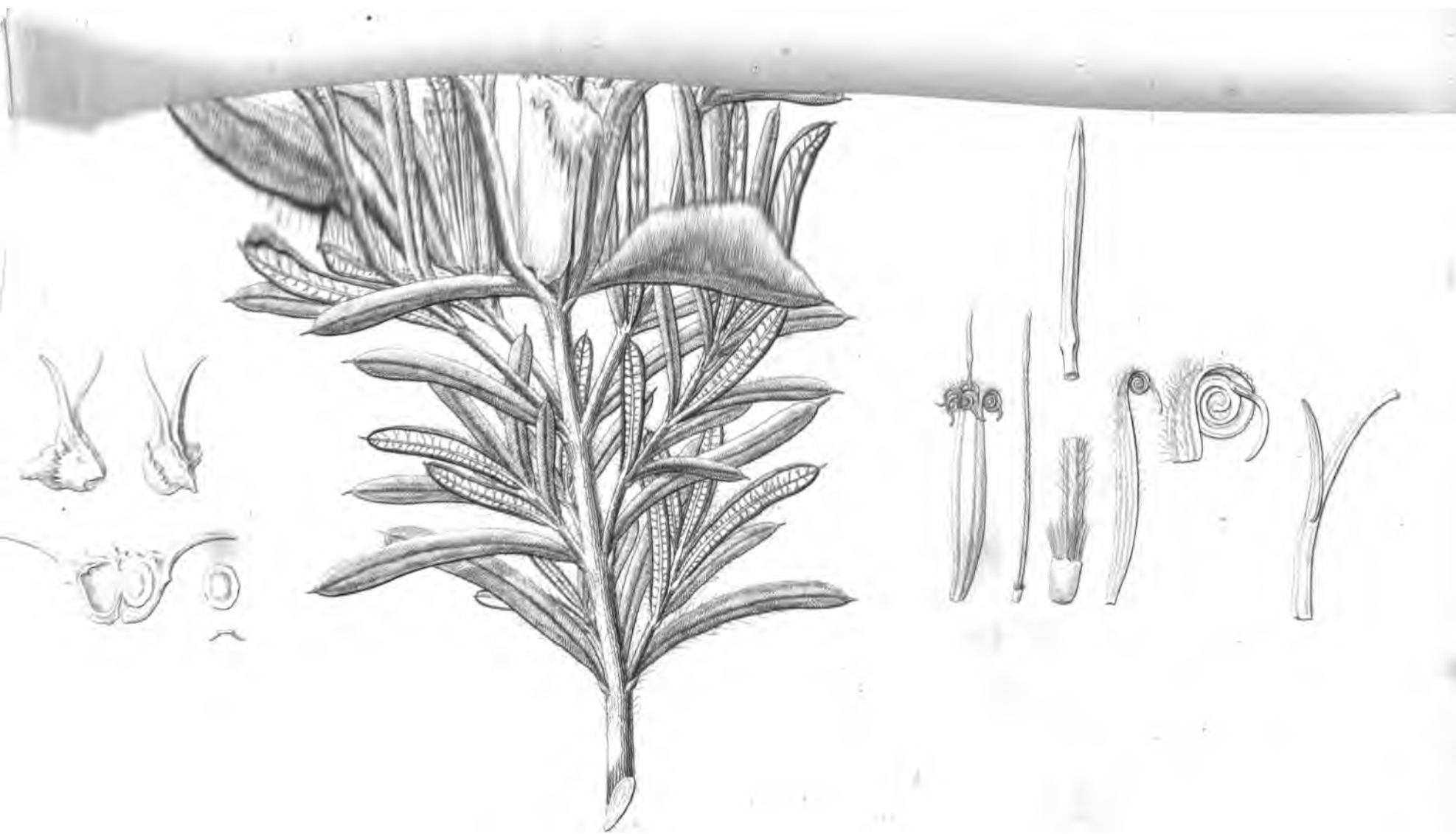
20. DIURIS.

GYNANDRIA *Diandria*, propè *Arethuſam.*

Ord. Nat. Orchideæ, *Juſſ. Gen.* 65.

CHAR. ESSENT. *Nectarium* dependens. *Petala* novem; quinque exteriora maxima, biformia. *Columna genitalium* reſupinata, ſupernè operculata.

Formoſum genus, ſcapo baſi foliato, floribus racemoſis ſpathaceis. Dignoſcitur primâ facie petalorum exteriorum duobus



Lambertia formosa.

Bauer del.

Mackenzie sculp.

duobus infimis elongatis, ferè calycinis, ſæpiùs linearibus. Columnâ gaudet reſupinatâ, orchideis omnibus huc uſque cognitis ſitu contrario, monente celeberrimo *Swartz*, quocum exemplaria communicavi.

Locus *Auſtralaſia.*

Tab. XX. exhibits the *Lambertia formoſa*, the only Species hitherto diſcovered of that Genus, (See page 214.) engraved from a Drawing made in New South Wales, and corrected from wild Specimens.

XIX. *Further Obſervations on the Wheat Inſect, in a Letter to the Rev. Samuel Goodenough, LL.D. F.R.S. Tr.L.S. By Thomas Marſham, Eſq. Sec. L. S.*

Read February 6, 1798.

DEAR SIR,

THE very imperfect knowledge that we gained of the wheat inſect in the year 1795, which through you was communicated to the *Linnæan Society*, who have honoured it with a place in the Third Volume of their *Tranſactions*, has ſtimulated me to purſue the enquiry with greater earneſtneſs, though not with additional zeal; for it has always been my invariable opinion, that the enriching of a cabinet with the works of the creation is but a ſecondary conſideration at beſt, and of little utility, unleſs an endeavour to inveſtigate their nature, œconomy, and properties, be provoked by it. Indeed I often lament, that my ſituation in the metropolis, and the few opportunities I have of enjoying the country, prevent me from purſuing my favourite ſtudy as fervently as I could wiſh. In the preſent caſe I conſider myſelf only as the firſt inſtitutor of an enquiry that has become important by the perſevering aſſiduity and accurate examination of our mutual friends, to whom I was ſo much indebted in the former caſe. Early in June 1797, I wrote both to Mr. Kirby and Mr. Markwick, requeſting that they would again turn their attention to the wheat fields, and examine the ears of that grain as they advanced, from the firſt appearance of

of the flower, until the ſeed was ripe; and the reſult of their unremitted endeavours, with a few of my own obſervations, I now lay before you, requeſting, that if you think them worthy their attention, you will preſent them to our valuable Society; for ſuch I think it may be truly ſtyled, ſince the opinion of the Public has ſo fully ſtamped its conſequence.

Mr. Markwick, in a letter to me dated the 17th July 1797, ſtates as follows:—"On the 12th of this month I firſt diſcovered ſome of the little flies (which I ſend you incloſed) ſitting between the huſks or clefts of the ears of wheat: the next day they appeared to me more abundant; and then, for the firſt time, I found a few of the ſmall yellow larvæ, which infeſted the wheat in the year 1795, ſitting cloſe to the ſtamina, exactly as they are repreſented in the 3d vol. of the *Linnæan Tranſactions*, page 251. Tab. 22. fig. 10. a; ſince that time I have found the larvæ in much greater abundance, and the fly is alſo to be ſeen, though I think not in ſuch great numbers. The other inſects which I have diſcovered on the wheat, are the *Thrips phyſapus*, in its larva and perfect ſtate, as in the year 1795; and ſome of the ears were infeſted with the plant louſe *(Aphis)* called here the Dolphin." On the 25th of July, I received alſo a letter from Mr. Kirby, that contained ſome valuable hints, which induced me to ſend a copy of it to Mr. Markwick; and on the 17th of September I was favoured with the following letter from that gentleman:—

"I want words to expreſs the pleaſure I received from your laſt letter, as well as from your obliging communication of that of your very ingenious and learned friend Mr. Kirby, and ſhould have acknowledged the obligation ſooner, but waited until the end of harveſt, with the ill-founded hope of having ſomething to communicate relative to our little inſect worthy of your notice; for I am ſorry to ſay,

that I have not had any ſucceſs in diſcovering the perfect ſtate of this inſect: however, I will relate exactly what has happened.

" I incloſed ſeveral ears of wheat, containing a number of the ſmall yellow larvæ, in a flower-pot, cloſely ſtopped at the bottom, and covered with gauze at the top; and have at different times found dead, at the bottom of the pot, two different ſorts of very ſmall flies, one of which was a ſhort thick black fly, with very long tranſparent wings, and long ſlender ſmooth antennæ, of which I have ſent two rude figures ſomewhat magnified, ſee Tab. xix. No. vi. fig. 1. a and b. The other fly was as minute, if not leſs, with a yellow body, ſpotted and tranſparent wings, and long jointed antennæ, beſet with ſmall hairs or briſtles at each joint, at leaſt ſo they appeared to me through a magnifying glaſs; but that you may, if you pleaſe, examine them yourſelf, I have ſent two along with the others, being all that I found of that kind, though I fear they are not in a good ſtate; and I have alſo incloſed ſuch figures as I was able to make of them, ſee Tab. xix. No. vi. fig. 2, a and b. To your learned friend's queſtion as to the quantity of miſchief done by this unknown fly, I fear I cannot give a ſatisfactory anſwer: I certainly think his average of two grains in each ear deſtroyed by this inſect not too great, for I ſcarcely examined any ears in which there were not more than that injured. But, after all, are not our fears with reſpect to the injury that the wheat has received from this inſect greater than they ought to be? and does not the wheat ſuffer as much from inſects or ſome other cauſe every year, even in thoſe years that are moſt productive?

" By what I can learn from enquiries, and from my own obſervation, there is a good crop of wheat in this neighbourhood: one farmer, who has begun to threſh out his wheat, has found it yield well; and when in my own field I had the curioſity to rub out a few ears,

and

and to count the number of grains in each, in none I found fewer than forty, and in one ſixty-two; nay, my ſervant found one with ſeventy grains, moſt of which were perfect, there being only three or four ſhrivelled in each ear—a proof, I hope, that notwithſtanding the depredations of this and other inſects, the crop will not turn out deficient." In another part of his letter, Mr. Markwick, with great probability, conjectures, "that theſe larvæ may feed on the farina, or male duſt of the ſtamina, and poſſibly prevent the proper fertilization of the piſtil in ſuch a manner as to occaſion the future grain to be ſhrivelled and imperfect."

In addition to the foregoing remarks, I can only ſubjoin a few obſervations of my own on the ears of wheat ſent me by Mr. Markwick, and let Mr. Kirby's accurate and valuable experiments follow as a ſeparate paper. On cloſe examination of a number of ears, I found from two to ſix grains inhabited by the larvæ, as repreſented in Tab. 22. fig. 10. a. in the 3d vol. of the *Linnæan Tranſactions*, except that the number of the larvæ was greater in many of them, and in one or two I found what appeared to be a pupa. Having incloſed ſeveral of thoſe ears in large phials, with gauze over the mouth, I ſoon perceived that they became covered with mould, and the larvæ quitting them fell to the bottom of the phials and periſhed. I then procured one of the chimnies made uſe of for Argand's lamps, in which I incloſed ſome other ears, covering each end with gauze: by this means a free circulation of air being permitted to paſs through, the corn remained clean, and the little animals have not quitted their ſituation; which leads me to conclude that they will change into the pupa ſtate, as many appeared to have done that were left in the box in which they came, ſo that I have great hopes of breeding the fly at the proper ſeaſon of the year, which I preſume is now approaching. The figure from Mr. Markwick's drawing, repreſented in Tab. xix. No. vi. fig. 2. agrees in general with the deſcription of *Tipula*

Tritici of Mr. Kirby, and perhaps may prove to be the different ſex; or it is poſſible that Mr. Kirby might have taken his inſect immediately on its quitting the pupa ſtate, and before the wings were completely dry, ſo that the obſolete clouds with which they are marked had not become viſible. The manner in which both theſe Gentlemen met with this fly leaves very little doubt in my mind of its being the true parent of the larvæ we have deſcribed; and this opinion is very much ſtrengthened by the very great affinity there ſeems to be between our *Tipula* and the *Tipula Juniperina* of Linnæus, and *Tipula Pini* of the Baron De Geer, Tom. vi. p. 417. Tab. xxvi. fig. 8—19; it however differs in colour from the Latin deſcriptions of thoſe inſects, although it agrees in the other particulars. But the long French deſcription which De Geer gives of *Tipula Pini*, varies very little from that of our inſect; and the figure, being uncoloured, would paſs for it very well, as the antennæ and wings ſeem exactly to correſpond: even the account of the larva is nearly the ſame, except that he remarks a thin green line paſſing through the body of his, which he conjectures to proceed from the food, viz. the leaves of the pine; if this be the fact, ſuch a line would not be viſible in our larvæ, as they feed on the pollen of the wheat, which is nearly their own colour: another difference is, that the larvæ of *T. Pini* form little reſinous caſes to preſerve themſelves during the Winter; but both continue unchanged until Spring, as appears by Mr. Kirby's opening one of the caſes, which he ſuppoſed contained the pupa, and finding the larva unchanged, from which I conclude that we have not yet ſeen the pupa. The flies of *T. Juniperina* and *T. Pini* do not come forth until May, which time will exactly ſuit our little animal for depoſiting its eggs in readineſs for the bloſſom of the wheat; and from the appearance of ſome of the little caſes which I have by me, that are ſo tranſparent as to admit of a perfect view of the larva, I am of opinion that they are approach-

ing to the pupa ſtate, as the maggot becomes more white and opake, and is evidently ſhrunk in length. Another circumſtance mentioned by the accurate De Geer, that unites them ſtill more cloſely, and confirms my conjecture of the two ſexes, is the difference between male and female; for he ſays, *Fæminæ alæ nigricantes*, agreeing with the clouded wings in our figure, and at the ſame time confirming Mr. Kirby's deſcription of his. In ſhort, ſo nearly are theſe inſects allied, that I ſhould have little heſitation to pronounce them the ſame, had they not fed on plants ſo very different in their nature and properties. The *Ichneumon Tipulæ* of Mr. Kirby has been ſo fully obſerved by all parties, that it requires nothing to be added here. I can only now obſerve, that the difficulty of inveſtigating and fully exploring the ſecret works of the Creator muſt be my apology for ſtill offering imperfect hints inſtead of a complete hiſtory, but I have done ſo with a view to excite other labourers to favour us with their communications and experiments; for, to uſe the words of my valuable friend Kirby, "If we can advance one ſtep, it is ſomething; and who can entirely remove the awful veil that conceals from mortal eyes the full beauty of the face of Nature, that envelopes in darkneſs her ſecret operations? To get now and then a glimpſe of the footſteps of him who is 'wonderful in working' is all that we can expect. The united force of ſuch obſervations, like rays collected by a lens, which, although when ſeparate they operate but ſlightly either as light or fire, will in time illuminate a ſubject, and make us ſee clearly in what darkneſs we were before. To collect theſe ſeparate rays is the office of the *Linnæan Society*, by whoſe means the light which each conveys is caught ere it be diſſipated, and thus many myſteries of Nature are elucidated, which otherwiſe might for ever have remained in obſcurity."

XX. *Hiſ-*

XX. *History of Tipula Tritici, and Ichneumon Tipulæ, with some Observations upon other Insects that attend the Wheat, in a Letter to Thomas Marsham, Esq. Sec. L. S. By the Rev. William Kirby, F.L.S.*

Read February 6, 1798.

MY DEAR FRIEND. *Barham, Sept.* 29, 1797.

WHEN you left me in July last, you desired me to continue my observations upon those insects that infest the wheat; and particularly to endeavour to complete the history of the larva, of which you have given an account in the 3d vol. of the *Transactions* of the *Linnæan Society* *, and which, with great justice, you suppose to be the *principal* enemy of the grain. In compliance with this request, I have endeavoured to trace it through all its metamorphoses, and to ascertain, in some measure, the quantity of mischief which it is capable of doing—with what success you shall now hear; and I shall add such other circumstances relative to this and other insects which attend the wheat, as have occurred to my observation. What I have collected, although far from being a complete history of *all* the insect infesters of that grain, may afford some few hints which may possibly be of use to assist the investigations of abler

* *Trans. Linn. Soc.* vol. iii. p. 242. Tab. xxii. fig. 9. 10. 11. 12.

Naturalists,

Naturaliſts, and, in conjunction with your own obſervations, and the information you will procure from the ingenious and accurate Mr. Markwick and other friends, be not unworthy of the notice of the public.

In the year 1795, when you firſt began to inveſtigate this ſubject, I obſerved very few of the larvæ in queſtion; and conſidering the *Thrips phyſapus* as occaſioning the greateſt quantity of injury, my chief attention was directed to that inſect; but in the preſent ſeaſon I have more particularly attended to the former. Wherever I have taken my walks, I have made it my buſineſs to examine thoſe fields of wheat through which I have paſſed, and I have ſcarcely paſſed through any in which ſome florets, of every ear that I examined, were not inhabited by theſe larvæ; and this has often been at ſome diſtance from hence. But although I have found the larvæ ſo abundant, the pupa has very ſeldom occurred to me; ſo that for fifty of the former, I think I may ſay without exaggeration I have ſcarcely found one of the latter. As many as I collected, I put into a tumbler covered with gauze, in which they remained ſome time without any imago making its appearance. At length I obſerved the exuvia of one lie at the bottom of the glaſs; but the imago, I ſuppoſe, had made its eſcape through the gauze, as I could not find it. Upon this I put the remaining ones into a ſmall phial, the mouth of which I ſecured with gauze four times doubled, and tied cloſe. About three weeks ſince, examining this one day, I obſerved a ſmall fly walking up its ſides: I opened it carefully, and ſecured my little animal, which upon examination appeared to be a very minute *Tipula*, nearly of the colour of the pupa. It is not deſcribed in Gmelin's edition of the *Syſtema Naturæ*, nor by any author that I have acceſs to; therefore I ſhall deſcribe it, and the little *Ichneumon* which depoſits its egg in its larva.

TIPULA.

TIPULA. *Alis incumbentibus. Culiciformes.*

Tritici. T. ferrugineo-rufa, alis hyalinis margine piloſis, oculis nigris.

Minima aurantiaca. *Antennæ* moniliformes thorace longiores. *Alæ* pilis ciliatæ. *Pedes* longiuſculi.

Longitudo ferè linearis.

Larva ſaltatrix, apoda, citrea, marginata margine plicato-papilloſo, capite acuto, caudâ truncatâ.

Habitat in *Tritici* ſpicis.

Pupa anguſta, utrinque acuta, rufeſcens.

ICHNEUMON. *Minuti, abdomine ovato ſeſſili.*

Tipulæ. I. niger, antennis baſi pedibuſque rufis; tibiis poſticis clavatis apice nigris.

Minutiſſimus, niger, nitidus. *Antennæ* fractæ, vibratoriæ, articulo primo longo rufeſcenti. *Alæ* aveniæ immaculatæ corpore longiores. *Abdomen* obovatum, depreſſum, ſubſeſſile. *Tibiæ* clavatæ, præſertim poſticæ.

Longitudo infra linearis.

Habitat in larvis *Tipulæ Tritici*, ovum unicum deponens in ſingulis.

After I had taken my little *Tipula*, I unfortunately loſt it. I had faſtened it upon a piece of paper with gum water, and left it for a time in an open box, that the gum might dry. I ſuppoſe ſome other inſect took that opportunity to devour it; for when I returned to put it to a place of greater ſecurity, it was gone, and ever ſince I have watched in vain for the diſcloſure of another.

It

It is ſingular that this ſpecies of *Tipula*, which muſt neceſſarily be very common, ſhould never have been noticed. So often as I have been, and at all times, in the corn-fields, with my attention always awake to entomological ſubjects, I do not recollect ever ſeeing it before. Since I loſt it, I have ſearched for it in a field where I found the larvæ in the greateſt plenty; I have examined the barn where the corn from that field was laid up; and in both inſtances was equally unſucceſsful. From theſe circumſtances it ſeems probable, that although one or two might be diſcloſed with me, by being placed in a ſituation where the ſun ſhone upon them, ſooner than their natural ſeaſon, yet that in general the fly does not make its appearance until the Spring, ſo as to be in readineſs to depoſit its eggs in the wheat, when it has made ſo much progreſs in growth, that the larva may be hatched about the time of its going into bloſſom. And I am confirmed in this opinion by another circumſtance: A few days ſince, with a fine needle, I carefully took off the thin membrane from two of the pupæ which I had reſerved, that I might ſee how near they were to a change of ſtate; but inſtead of diſcovering the lineaments of the future fly, the inſect was ſtill in the form of the larva*: ſo that probably the pupa is not uſually complete until the Spring, and the inſect incloſes itſelf in a thin membrane to protect itſelf from the cold of the Winter.

I obſerved above, that the *pupæ* which I met with bore no proportion in number to the *larvæ*. I have ſeen more than once ſeven or eight florets in an ear inhabited by the latter, and ſometimes ſo many as thirty in a ſingle floret, ſeldom leſs than eight or nine, and

* It may be objected that this was probably the larva of the *Ichneumon*, which had devoured that of the *Tipula*. To this I reply, that it was in colour, form, and in every reſpect ſo exactly ſimilar to the latter that it could be no other.

yet I have ſcarcely ever found more than one pupa in an ear, and had to examine ſeveral to meet with that. What then becomes of the remainder of the larvæ? Are they deſtroyed by that of the *Ichneumon?* or do they become the prey of ſome other inſect? or do they fall to the ground when they aſſume the pupa, and remain there until the following Spring? To give a poſitive anſwer to any one of theſe queries I ſhall not pretend; I will only relate circumſtances, and point out what from them appears to me to be moſt probable. The pupæ that I have obſerved have generally been ſomewhat attached to the grain, and, what is worthy of notice, I never found them within thoſe florets where the larvæ had taken up their reſidence; they ſeem invariably to chooſe for their habitation, in their intermediate ſtate, one where the grain is uninjured, to which they may attach themſelves. A queſtion here ariſes, how they contrive to get from one floret to another, having no feet? but as I have never ſeen them do this, I will not attempt to conjecture how they do it. In the field above-mentioned, I took up many roots of ſtubble, with a large lump of earth round them, to ſee if I could diſcover any of the pupæ concealed in it; but if they were there, they eſcaped my eye, from their minuteneſs: yet it ſeems not probable, nor analogous to the general proceedings of nature, that it ſhould be indifferent to them whether they go under ground, or remain in the ear, when they aſſume the pupa. That they are deſtroyed by any other inſect than the *Ichneumon*, I have no reaſon to believe, having never ſeen them attacked by any other; therefore it ſeems to me moſt probable that this little friend to man is the deſtroyer of by far the greateſt part of them. If this be the caſe, what a benefactor to the human race is this diminutive animal! and how ought we to admire and adore the wiſdom and goodneſs of Divine Providence, in thus ſetting bounds to the ravages of an inſect, which, however inſignificant it

may

may ſeem at firſt ſight, might, if permitted to exceed its due limits, deprive us of the ſtaff of bread, and almoſt occaſion the deſtruction of our ſpecies! The ſuperſtition of the Ancients, had they been acquainted with the advantages which appear to be derived to man through the inſtrumentality of this important though minute link in the chain of creation, would have erected altars to it, as to a beneficent deity: Can we, who enjoy the clear light of revelation, do leſs than adore and extol that goodneſs, which thus preſerves a due balance in his works, and ſays to the deſtroyer, Thus far ſhalt thou come, and no further*? Indeed the numerous ſpecies of the genus *Ichneumon* ſeem to have been created on purpoſe to keep within due bounds the other tribes of inſects. Any perſon who has obſerved the depredations committed in our gardens by the caterpillar of the cabbage butterfly, may conjecture to what extent they would be carried, were it not given in charge to the Ichneumon of that inſect to keep them within their aſſigned limits. In a word, were it not for this philanthropic genus, we ſhould not be able to ſtir, nor even breathe, without being annoyed, nay ſuffocated by myriads and myriads of troubleſome animals, which are now taught to know their proper bounds, and anſwer the ends for which they were created. But why do I thus moralize to you, to whom theſe reflections are perpetually recurring? I ſhall therefore return to my hiſtory.

It is ſingular, but moſt people who are acquainted with the larva of the *Tipula Tritici* miſtake this friendly *Ichneumon* for its parent, and thus impute all the miſchief to the very creature which

* Finis creationis telluris eſt gloria Dei, ex opere naturæ per hominem ſolum. *Linn.* Omnes res creatæ ſunt divinæ ſapientiæ et potentiæ teſtes: divitiæ felicitates humanæ. Ex harum uſu bonitas creatoris; ex pulchredine ſapientia Domini; ex œconomia in conſervatione, *proportione*, renovatione, potentia majeſtatis elucet. *Id.*

is appointed to prevent it. It is ſome ſatisfaction to me to confirm your opinion* and do juſtice to our little benefactor, and to point out where the odium ought to fall.

To ſee our little *Ichneumon* depoſit its egg in the caterpillar of the wheat fly, is a very entertaining ſight. In order to enjoy this pleaſure, I placed a number of the latter upon a ſheet of white paper, at no great diſtance from each other, and then ſet an *Ichneumon* down in the midſt of them. She began immediately to march about, vibrating her antennæ very briſkly:—a larva was ſoon diſcovered, upon which ſhe fixed herſelf, the vibratory motion of her antennæ increaſing to an intenſe degree; then bending her body obliquely under her breaſt, ſhe applied her anus to the larva, and during the inſertion of her *aculeus*, and the depoſiting of the egg, her antennæ became perfectly ſtill and motionleſs. Whilſt this operation was performing, the larva appeared to feel a momentary ſenſation of pain, for it gave a violent wriggle. When all was finiſhed, the little *Ichneumon* marched off to ſeek for a ſecond, which was obliged to undergo the ſame operation, and ſo on to as many as it could find in which no egg had been before depoſited—for it commits only a ſingle egg to each larva. I have ſeen it frequently mount one which had been pricked before, but it ſoon diſcovered its miſtake and left it. The ſize of it is ſo near that of the *Tipula*, that I imagine the larva of the latter could not ſupport more than one of the former, and therefore inſtinct directs it to depoſit only a ſingle egg in each; beſides, by this means one *Ichneumon* will deſtroy an infinite number of larvæ.

The larva of the *Tipula Tritici* (as Mr. Markwick, in his letter to you, dated July 17, 1797, has well conjectured) appears to feed upon

* *Tranſ. Linn. Soc.* vol. iii. p. 243.

the

the pollen or duſt of the antheræ, for in thoſe florets in which it reſides the germen never ſwells, and the antheræ are perſiſting; from which it ſeems evident that the impregnation of the germen is prevented, either by the inſect's uſing ſome means, perhaps a kind of gluten, to prevent the pollen from burſting from the antheræ, or, *vice verſa*, by doing ſomething to the ſtigma to prevent the fertilization of the germen. The pollen of three antheræ is a ſtore which will maintain ſometimes thirty of theſe creatures, from the time that the wheat is in bloſſom, until it is nearly if not altogether ripe. I could never diſcover that the grain was injured in any other way by this inſect, but it invariably produces the inanition of it in the floret which it inhabits. It may always be detected by the diſcoloured appearance of the baſe of the corolla, which is its uſual ſtation.

Although Mr. Markwick could not diſcover any damage done to the wheat in the year 1795, yet, upon a cloſer examination in the preſent year, that gentleman ſeems convinced that the inanition of the grain takes place wherever the larva makes its attack, as appears by his letter above quoted. My own obſervations fully confirm this opinion; and the miſchief occaſioned by it will appear to you very conſiderable, at leaſt in this neighbourhood, when you weigh the following reſult of a particular examination of my own, which had this circumſtance for its object.

To aſcertain the quantity of miſchief produced by our *Tipula* within particular limits, I went to a field of fifteen acres, which was planted partly with white and partly with red wheat. In this field I took five ſtations, one on each ſide, and one in the centre. In each ſtation I examined a certain number of ears, grain by grain, without ſelection. The reſult was, that in thirty ears of white wheat, ſeventy-three grains were deſtroyed by the larva, which is at the

rate

rate of not quite two and a half grains to an ear; and in twenty ears of red wheat, twenty-nine grains were deſtroyed, which is nearly at the rate of one and a half grains to an ear. Take the whole together, and the proportion will be about two grains in an ear, which I ſuppoſe may be about a twentieth part of the produce, and would make a difference of at leaſt five coomb in the crop in this field. The white wheat in this inſtance was moſt expoſed to the attack of the inſect;—whether this be generally the caſe, muſt be determined by future experiments upon a more extenſive ſcale. Leaſt miſchief ſeemed to be done on the South ſide of the North hedge; but no part eſcaped wholly—not an ear I examined but what had ſuſtained ſome injury. From the field that I have been ſpeaking of I went to another, which was ſown later in the Autumn: in this I found ſcarcely any of the larvæ; but it was very much infeſted by the *Aphis*, called in Mr. Markwick's letter above-mentioned the Dolphin*. The ſame ſpecies of *Aphis* is ſufficiently common upon barley and oats, as well as wheat: I found very few of theſe in the firſt field. The red gum, which is undoubtedly a kind of *Fungus*, appears to me totally unconnected with the inſects that infeſt the wheat: in the field where I found an infinity of the larvæ of the *Tipula Tritici*, and *Thrips phyſapus*, I ſcarcely found any

* Poſſibly this may be the *Aphis Avenæ* of Fabricius: but as he has given no deſcription of it, I cannot be poſitive; I ſhall therefore deſcribe it under the name of

A. *granaria*, viridis, cauda biſeta, ſetis geniculiſque pedum nigris.

Aphis avenæ. *Fab. Sp. Inſ.* ii. p. 386. n. 17. *Gmel.* tom. 1. part. iv. p. 2206. n. 52. *Vill. Ent. Eur.* 1. p. 551. n. 50?

Caput flavidum uti antennarum articulus primus. *Oculi* nigri. *Abdomen* obovatum caudâ aculeatâ. *Pedes* lividi, tarſis geniculiſque nigris.

Habitat in *tritici* et *hordei* ſpicis, *avenæque* paniculis.

florets

florets which produced this little plant; but ſome ears of a kind of bearded wheat, which I cultivated in my garden, were quite diſcoloured by it, without any larva attending upon it. Of all the inſects that are found in wheat, the *Thrips phyſapus*, in all its ſtates, is by far the moſt numerous. I do not recollect examining a ſingle ear in which it was not to be found; and my opinion ſtill remains unaltered, that it derives its nouriſhment from the grain; nor can I look upon the ſpecies of this genus as carnivorous, any more than thoſe which belong to its neighbouring genera, *Aphis*, *Chermes*, and *Coccus*.

I have nothing further at this time to add upon this intereſting ſubject, and therefore believe me, &c.

XXI. *Account*

XXI. *Account of a New Species of Muſcicapa, from New South Wales. By Major-General Thomas Davies, F. R. S. and L. S.*

Read February 6, 1798.

HAVING had the good fortune to procure fine ſpecimens of the male and female of a ſingular bird from New South Wales, which the natives of that country call the *Merion Binnion*, or Caſſowary-Bird, and as it is a ſpecies at preſent very little known, I am induced to preſent to the Preſident and Members of the Linnæan Society an accurate drawing of both ſpecimens, in hopes that it may be found worthy of their acceptance. I am ſorry that I cannot at the ſame time furniſh the Society with an accurate account of its manners. Even its genus appears to be rather difficult to determine with the certainty I could wiſh, and I ſhall therefore leave that deciſion to others more capable than myſelf. I have, as yet, claſſed it in my own collection with the *Flycatchers*, as it appears to me to approach neareſt to that genus.

All the information which I have been able to procure reſpecting it, from Governor Philip, Colonel Nepean, and other Gentlemen, who reſided ſome years in New South Wales, is, that it is found about Sidney and Botany-Bay, in marſhy places, abounding with long graſs and fine ruſhes, in which it hides itſelf very dexterouſly; that,

that, when diſturbed, its flight is very ſhort, like that of a graſshopper; and that it no ſooner alights than it runs with ſuch great agility that many who have been confident of their having covered birds with their hats, have, to their great ſurpriſe, ſeen them again take wing at no great diſtance: ſo that they are always difficult to catch. I have, however, to obſerve, that the colour of the bird, and the length of its legs, muſt greatly contribute to its ſo eaſily eſcaping the vigilance of thoſe who purſue it. I am alſo induced, from the circumſtance of its bill being well ſurrounded with briſtles, to think that its food is ſmall flies, and other inſects which it catches amongſt the roots of the graſs and ruſhes.

The length of the bird, from the point of the bill to the end of the rump, is three inches; the bill is three-eighths of an inch long, of a browniſh black colour, conſiderably curved at the point, having the baſe furniſhed with ſtrong briſtles, and noſtrils large and low down; irides uncertain; head much flattened and narrow towards the baſe of the bill, with a pale azure bar from the baſe of the bill over the eye; throat, to the centre of the neck, on each ſide, azure; front part of the head, cheeks, breaſt, fore part of the ſhoulders, thighs, ſides and rump, ferruginous; centre part of the belly nearly white; hind part of the head, neck, ſhoulders, back and rump, greyiſh brown, elegantly ſtreaked with browniſh black; feathers of the back and rump, long, ſoft, and of a ſilky texture; wings very ſhort, ſcarcely reaching to the baſe of the tail, of a dark browniſh black colour, edged with rufous brown; legs ſlender, three-fourths of an inch long, of a pale dun or horn colour; feet ſlender and long; claws crooked and very ſharp, eſpecially the hind one, which is the largeſt, all of the ſame colour with the legs; the tail, independent of the body, is four inches and more in length, ſhafts black and very ſlender, armed on each ſide with minute

ſlender filaments, like hair, of a black colour. The female is like the male in every reſpect, excepting that it has no azure bar over the eye, and that it is entirely of a ferruginous colour from the baſe of the under-mandible to the vent.

The natives of New South Wales give the name of *Merion Binnion* to this bird, on account of the great reſemblance of its tail to the feathers of the Caſſowary.

Since the above account was written, Dr. Shaw has examined the bird therein deſcribed, and has named and characterized it as follows:

MUSCICAPA *malachura.*

Soft-tailed Flycatcher.

M. fuſca, ſubtus ferruginea; gula (maris?) cœrulea; cauda longa cuneata, rectricibus decompoſitis.

Brown Flycatcher, ferruginous beneath; the throat (of the male?) blue; the tail long and cuneated, with looſe-webbed feathers.

TAB. XXI. repreſents the *Muſcicapa malachura*, male and female.

XXII. *Obſer-*

Linn. Trans. IV. tab. 21. p. 242.

XXII. *Observations on the Genus Pausus, and Description of a New Species. By Adam Afzelius, M. D. Demonstrator of Botany in the University of Upsala, F. R. S. and F. M. L. S.*

Read March 6, 1798.

IN a dissertation published at Upsala in the year 1775, and called *Bigæ Insectorum*, Linné described two new genera of insects, to one of which he gave the name of *Paussus*. The etymology of this word, though he does not explain it himself, is probably the Greek παῦσις, signifying a *pause*, a *cessation*, a *rest*. But then it ought to be spelt with only one *s*; and in either case it would be difficult to comprehend the reason of his applying it to the insect in question. The former, however, may easily be accounted for as a trifling error of the press; and the latter, I imagine, it may not be improper to explain in this way:—Linné, old, infirm, and sinking under the weight of age and labour, saw no possibility of continuing any longer his glorious carreer: wishing therefore to put a stop to his usual amusements and useful exertions, he would say,

——— hic meta laborum;

and so it was as to insects, for *Pausus* is the last he ever described, and afterwards he published only two small botanical dissertations.

But whether this etymology and explanation be right or wrong, I cannot find any better; and thus I am induced to follow Thunberg, Gmelin, and Herbſt, in their mode of ſpelling *Paufus* with one *ſ*, being as to my idea the moſt rational.

Linné knew but one ſpecies of this genus, from which he took the generic character, and which he called (from μικρὸς and κεφαλὴ) *micro-cephalus*, on account of its head being very ſmall in proportion to the other parts of the body. It is ſhortly deſcribed in the diſſertation above-mentioned, and five figures of it ſubjoined, repreſenting it in different views, two in its natural ſize, and three in a magnified one.

After this original account of Linné, there have been very few authors that have publiſhed any thing concerning *Paufus*. Thoſe I have had an opportunity of ſeeing, and I think I have ſeen all, are the following; and whoſe writings I ſhall mention in the ſame chronological order as they have appeared.

Thunberg, during his travels in the country of the Hotentots, in the year 1772, having met with two unknown inſects, deſcribed them as conſtituting a new genus in the claſs of Coleoptera. But having returned to Sweden, and being then acquainted with the *Paufus* of Linné, he thought his two ſpecies might be referred to this genus, eſtabliſhed during his abſence; and accordingly he wrote a paper on the ſubject, which he delivered to the Royal Academy of Science at Stockholm, and which is printed in its Tranſactions for the year 1781.—Here he deſcribes and ſpecifies his two inſects, calling the one *Paufus ruber*, and the other *Paufus lineatus*; annexing two figures of the laſt mentioned, one ſhewing it in its natural ſize, and the other repreſenting it magnified. He alſo makes ſome few additional remarks on the genus itſelf, and gives the ſpecific difference of P. *microcephalus*.

Fueſsly,

Fueſsly, without taking notice of what Thunberg had written on the ſubject, republiſhed Linné's original account in the 3d number of his *Archiv der Inſectengeſchichte*, printed at Zurich 1783. The whole deſcription, as well as all the figures, are expreſsly copied; but the other remarks are tranſlated into the German language.

Gmelin, in his *Linnæi Syſtema Naturæ* of 1788, ſeems to have confined himſelf only to the peruſal of the text of Fueſsly, tranſcribing even his error; which he ſurely could never have done, had he at the ſame time conſulted the original of Linné.

Herbſt, in his *Natur Syſtem der Inſecten*, the 4th part of the Coleoptera, publiſhed at Berlin 1792, has inſerted both Linné's and Thunberg's ſpecies, but tranſlated their deſcriptions of them into German, and given them new ſpecific characters in Latin, though not very recommendable for correctneſs either ſcientific or typographical. To this he has ſubjoined a plate, repreſenting, amongſt many other inſects, alſo two figures of P. *microcephalus*, and two of P. *lineatus*; the former copied from the diſſertation of Linné, and the latter from Thunberg's paper in the Tranſactions of the Swediſh Academy of Science.

Fabricius began in the ſame year, or 1792, to publiſh at Copenhagen his *Entomologia Syſtematica*. Not having before taken notice of *Paufus* in any of his writings, he now introduced it in this work; not however as a diſtinct genus, but putting it under his *Cerocoma*, he calls Linné's inſect C. *microcephala*, and the figured one of Thunberg C. *lineata*. The other, or *Paufus ruber*, he does not mention at all.

An anonymous author, or probably more than one, have laſtly publiſhed at Winterthour in the canton of Zurich, in the year 1794, a French tranſlation of Fueſsly, combining all his ſeparate numbers in one continued volume, and calling it *Archives de l'Hiſtoire des Inſectes*

Inſectes de Fueſsly. Here occurs nothing but what is found in the original edition, except a new blunder, and a remark in the notes to this purport: "that there are two other ſpecies of *Pauſus* mentioned in the memoirs of the Swediſh Academy, and that Fabricius, not having examined theſe inſects as minutely as he ought, has placed them amongſt his *Cerocomæ*, till there may occur an opportunity of determining their genus with more accuracy."

Theſe are all the writers I have ſeen who treat on the genus and ſpecies of *Pauſus*. And it is very remarkable, that almoſt every one of them has committed ſome miſtake. This may be excuſable, when there are ſeveral accounts of a natural production from ocular obſervations of different perſons; but not ſo when there exiſts only one, as is the caſe in regard to Linné's *Pauſus*; for though Thunberg and Fabricius may both have ſeen it, yet neither of them has added any thing to illuſtrate it but what might have been collected from Linné's deſcription and figures of it, the latter having only created greater confuſion than any before him, by putting it among the *Cerocomæ*. As to Fueſsly, Gmelin, Herbſt, and Fueſsly's tranſlators, I am almoſt certain they never ſaw a *Pauſus*; and therefore, whatever they have written, they ought to have taken from Linné, and are to be eſteemed in proportion as they have copied him faithfully.—But I ſhall ſtate their reſpective miſtakes more at large, when I come to the hiſtory of P. *microcephalus* in particular, and ſhall now in the firſt place ſettle the characteriſtics of the genus.

Beſides the Linnæan ſpecies, which I have examined here in London, I brought another nondeſcript with me from Africa, which, in imitation of Linné's, deriving the ſpecific name of his from the Greek, I call (from σφαῖρα and κέρας) P. *ſphærocerus*, on account of each of its antennæ bearing at its end a large and remarkable globe.

Both

Both theſe ſpecies I have carefully compared, and found to agree in many circumſtances; but I ſhall here only mention the moſt ſtriking ones, as well as thoſe which ſtand in need of ſome explanation, or where, from want of proper *termini technici*, I ſhall be under the neceſſity of uſing circumlocution in order to be underſtood.

The *Body* is hairleſs, ſmooth, and poliſhed, above ſomewhat depreſſed, before narrower, and behind nearly cylindrical; the *ſize* ſmall, being from the top of the antennæ to the end of the abdomen only three lines long, and acroſs the elytra not quite one broad; the *colour* uniform, a darker or lighter brown; the *motion* ſteady and ſlow, at leaſt in the ſpecies I have ſeen alive. It is very unlike all other genera I know; but it ſeems to come neareſt to the *Clerus* of Fabricius, bearing to it, at leaſt upon the whole, ſo much natural reſemblance that its moſt proper place in the ſyſtematical arrangement will be next after that genus.

The *Head* is ſmaller and ſhorter than the thorax, almoſt round, and at the baſe ſurrounded as it were by an annular ſegment; in the living animal it is pointing ſtraight forward, but when dead it commonly bends a little downwards. The *clypeus* is minute, and more or leſs depreſſed in the middle. On the *throat* there is a convex ſpot, raiſed in form of a triangle, which is nearly equilateral, the baſe of which forms a croſs-bar between the eyes, its two upper angles being acute, but the lowermoſt cut off by the annular ſegment juſt mentioned.

The *Eyes* are rather large, tranſverſally oblong, prominent, and ſituated in a ſocket, the brim of which is elongated into one angle before lying horizontally, and another behind ſtanding upright; which ſtructure ſeems to prevent the inſect from being able to look in any other direction than forwards.

The

The *Antennæ* are very remarkable, and different from thoſe of all other inſects, not only by their conſiſting of no more than two joints, but alſo by their ſingular mechaniſm. The *under-joint* is a thick and almoſt round knob, truncated at both ends, and below on the outſide furniſhed with a little bright ball, moving in a cavity on the head, juſt before the eye, between the clypeus and the anterior angle of the eye-ſocket. This ball is the pivot on which the whole antenna rolls or performs its rotatory motion. It is very viſible at its root, and eaſily miſtaken for an eye, being quite globular, and, by continual rubbing, highly poliſhed. The *upper joint* is alſo a kind of knob, but of a very different nature, and curiouſly conſtructed. In the front it is outwardly marked with a raiſed line, or an edge, running from the baſe to the vertex, and behind elongated into a tube or a hook pointing inwards. Beneath it is furniſhed with a pedicle, which having a ball at the end, and being inſerted in the under-joint, towards the outſide of its top, as into a ſocket, makes the upper-joint qualified for a ſeparate motion, independent of that of the whole antenna. And as a proof that this is really the caſe, it is to be obſerved that there are ſcarcely two antennæ to be met with, having the elongated hind part of the upper-joint pointing exactly the ſame way, though the under-joint remains in its uſual poſition; which makes it very difficult to determine the true and moſt natural direction of this hind part, which however, I ſhould think, muſt be either juſt above the under-joint, or a little on the outſide of it. Linné gives to this part the name of *hook;* and ſo it is in my ſpecies, but in his own it reſembles more a tube or a blunt ſpur, or rather it is nothing elſe than a ſhort contracted elongation of the upper-joint. But, having made this remark by way of explanation, I ſhall not ſcruple to retain the original term *uncinata*, as applied to the upper-joint, called by

Linné

Linné *clavæ*, to which I alſo would add his other appellation of *ſolidæ*, if it could be done with any ſort of propriety. By this epithet he certainly meant nothing more than *integer*, adopting it in contradiſtinction to *lamellatus* and *perfoliatus*. And it anſwered the purpoſe very well, as long as no other inſects were known than thoſe having their clavæ entire and at the ſame time ſolid. But now it would imply a contradiction, ſince we have got a coleopterous inſect with an entire clava though not ſolid; which is undoubtedly the caſe as to P. *ſphærocerus*, being provided with clavæ, or head-balls, almoſt pellucid, and ſeemingly containing no ſubſtance whatſoever but perhaps ſome fine liquid. As to the clavæ of P. *microcephalus* I am not ſo certain, but they have alſo an appearance of being inflated; and beſides, as they are larger than the whole head, one would ſuppoſe them too heavy to be carried in the front, if quite ſolid. However this may be, the word is ſtill improper in regard to the other ſpecies, and I ſhall therefore avoid uſing it. The under-joints of both ſpecies are almoſt parallel, but the upper ones very diverging. On the vertex of theſe latter, at the end of the raiſed line above deſcribed, there are one or more ſmall protuberances, tipped with fleſhy ſubſtances, like hairs, which probably are organs for feeling.

The *Mouth*, and its different parts, as to their ſhape and ſtructure, I have not been able to aſcertain ſo accurately as I could wiſh, and as it ought to be done; for, independent of their ſmallneſs in ſo little an animal, it is quite impoſſible to deſcribe them rightly, without their being taken ſeparate from one another; and for this purpoſe I had not any of theſe rare inſects to ſacrifice, three of one ſpecies and ſix of the other being all which I have ſeen. Beſides, the former were not my own; the latter I could ſubject to a cloſer ſcrutiny, not minding much whether any of them became broken. The

conſequence of which is, that I am better acquainted with P. *ſphærocerus* than with the other. The mouth, however, of both ſpecies, and the various parts belonging to it, I have been obliged to examine in their unſeparated ſtate, and I have been therefore unable to avoid all miſtakes, as the innermoſt are more or leſs concealed by the exterior ones. But I muſt confeſs that even theſe latter, which I can plainly ſee through a compound microſcope, do not appear to me exactly ſuch as Fabricius will have them to be. I ſhall deſcribe them all as I have found them.

The *Palpi* are four in number, and ſeem all to ariſe from the croſs-line between the eyes, or the baſe of the jugular triangle before mentioned. The two placed in the middle and farther in, and perhaps alſo a little higher up, are three times as long as the others, at the bottom nearly approximate but afterwards diverging, flat within and convex without, moving on two ſmall tubercles at the baſe, above which they are firſt contracted, and ſo more or leſs widened. They may alſo, although my obſervations have not ſatisfied me on the ſubject, be in ſome way or other attached to the lowermoſt and external part of the labium. In thoſe of P. *microcephalus* I cannot find the leaſt veſtige of articulation except the baſe-hinges; but thoſe of P. *ſphærocerus* ſeem to be jointed all along, though I cannot aſcertain it as a fact, not being able to make out any number of joints, even with the greateſt magnifying power which I have uſed. Theſe palpi would probably be called *poſteriores* or *poſtici* by Fabricius, but the appellation of *interiores* appears to me much more ſuitable. The other two, which he perhaps would name *anteriores* or *antici*, anſwer every deſcription of being *exteriores*, for they are not only placed on the outſide of the interior ones, and cloſe to them, but alſo on the outer margin of the often mentioned guttural croſs-bar. They are, beſides, very ſmall, erect, compreſſed,

compreſſed, narrower towards the top and blunt, and ſeem to have neither joints nor motion, nor the ſame ſtructure as the others, being minutely punctated. Whether or not they internally adhere to the maxillæ, is impoſſible for me to decide; but certain it is, that if they do, it cannot be to any other part than their very baſes.

The *Mandibulæ*, alſo inſerted in the jugular croſs-line between the exterior palpi and the anterior angle of the eye-ſocket, extended to the middle of the under-joint of the antennæ, and, moving on two hinges below, are upon the whole arched, acuminated, and forcipated: but, to ſpeak more particularly, they conſiſt of three different parts, viz. two horny caſes or ſheaths, the inferior of which is the largeſt and almoſt ſtraight; the ſuperior narrower, ſhorter, and bending inwards; and from the top of this there comes out a ſtill narrower round and fleſhy hook, which meets that of the other mandibula, and ſeems to be a true inſtrument for feeling. The ſtructure of the lowermoſt ſheath being the broadeſt, and the other broader than the hook, makes the mandibulæ appear as drawn out below on the inſide, and as if furniſhed with two teeth, the inferior of which is covered with ſmall hairs.

The *Maxillæ* being hidden by the mandibulæ, the exterior palpi and the labium, I cannot ſee any thing of them but their very tops, which are extended above the lip, or between it and the mandibulæ, and appear to be arched, horny, cylindrical, toothleſs, ſharp-pointed and forcipated.

The *Labium* is rather large, thin and membranaceous, of equal length and breadth, longitudinally raiſed in the middle, entire at the top, and there furniſhed with hairs. It is beſides ſhorter than the interior palpi, and often covered by them, which then are placed one on each ſide of the longitudinal carina. That of P. *ſphærocerus*

is nearly truncated, and downwards inflected; but that of P. *microcephalus* ſhews an appearance very different, its top being ſeemingly drawn out in the middle into a point, and its keel longitudinally ſulcated, as if the lip were bipartite. Whether theſe appearances are optic illuſions, or realities, or owing to the ſubjacent maxillæ, I do not pretend to determine. But ſo much is certain, that, by repeated obſervations, I have not been able to diſcover any fiſſure in the middle tip of the labium, viewed in front.

The *Thorax*, though very unlike in theſe ſpecies as to many particulars, is nevertheleſs upon the whole of the ſame ſhape. It is narrower than the elytra, and uneven, conſiſting of two diſtinct parts, the foremoſt a little raiſed all around, and the other not only lower, but alſo broader, and either depreſſed or excavated in the middle, being otherwiſe nearly cylindraceous; and therefore the term *attenuatus*, uſed by Thunberg, ſeems not to be very appoſite, though it may anſwer much better the deſcription of his own ſpecies. But even ſuppoſing that the thorax tapers towards the baſe, it would be the very reverſe of *attenuatus* as applied elſewhere.

The *Elytra* are linear, almoſt flat, ſmooth, thin and flexile; the baſe, containing the ſmall *ſcutellum*, is not only much contracted, but even narrower than the thorax; the exterior margins, bent down, cover a great deal of the abdomen; and the truncated ends are inflected behind; but to avoid a fold being neceſſary in the outer angle on each ſide, where the incurvated borders of the ſides and the ends meet, the elytra are there cut out into minute ſinuſes, the edges of which being a little raiſed form as it were ſmall oblong tubercles.

The *Abdomen* is of the ſame thickneſs throughout, and compoſed of five ſegments; *above*, it is nearly flat, and of a light changeable ferruginous

ferruginous colour, looking as if pellucid, and the posterior margin of the last segment but one as if raised above the terminal, which is dark-coloured, very large and bent down, being behind circular and marginated; *underneath*, and on its fore-part, the abdomen is marked with a little convex plat situated between the second and third pair of feet, and further towards the end it is gibbous, the first and the fourth of the segments being much broader than the others, and the cavity under the thighs of the hinder feet surrounded by a circle of very minute and approximated dots. In the specimens of P. *microcephalus* which I have had to examine, this cavity being covered by the thighs, and the upper part of the abdomen by the elytra, I can see only very few of the dots; nor am I able to ascertain whether the whole back of the abdomen is as light-coloured as that of P. *sphærocerus*.

The *Feet* are all nearly of an equal length, the two first being inserted in the fore-part of the thorax, or rather of the breast; the two second in the base of the venter at the top or contracted end of the little plat above mentioned; and the two last in the middle of the venter. The *thighs* are thicker than the legs, particularly those of the hinder feet; they are without hairs or spines, of an oblong shape, but more contracted at the base, and compressed, though at the same time gibbous on both sides; they are moveable in a transverse direction by aid of a light-coloured appendage, which being attached to their base within, rolls in a socket below, and which on the hinder feet is very large, oval, and compressed to an obtuse edge, but on all the other feet it resembles more a tubercle, being almost round; the thighs are lastly cut out at the top, and their inner margins a little beyond the middle, for the inward motion and contraction of the *legs*, which also are compressed but not gibbous, and on the edges more or less furnished with short hairs.

hairs. The *tarſi* are nearly cylindraceous and very ſlender, compoſed of four joints, three of which are of equal length, but the outermoſt longer, all marked at their tops with a hair on each ſide, and otherwiſe hardly diſtinguiſhable. At the end of the tarſi there are two longiſh claws, crooked inwards, and diverging.

From this generic deſcription it is very eaſy to be convinced that *Pauſus* never can be of the ſame genus as *Cerocoma*. And it is rather a matter of ſurprize that Fabricius, who always has been ready to divide the genera of Linné, and ſometimes has done it for reaſons, I fear, not very urgent, ſhould now unite two ſo ſtrikingly and eſſentially diſtinct. He ſays, it is true, "that he has only put it in here for future examination, that it ſeems to be a genus of itſelf, and that he does not know it rightly." But then it might perhaps have been as well not to have mentioned it at all. Be this however as it may, in order to prevent any farther miſconception on the ſubject, I will here ſtate all the principal circumſtances by which *Cerocoma* differs from *Pauſus*.

The *Body* is of an oblong ſhape, and almoſt of an equal breadth throughout, the head and the thorax being ſcarcely narrower than the elytra. It is found without the tropics in the South of Europe and the moſt Northern parts of Africa, on plants growing in open fields.

The *Head* is oval, and inflected downwards.

The *Antennæ* are ſmall, ſcarcely as long as the thorax, and compoſed of many joints of various ſize and ſhape, particularly thoſe of the male. And therefore I do not comprehend what could induce Fabricius to call the joints equal, and the antennæ moniliformes, eſpecially as he adds that the latter are *irregulares*; for this term, according to the ſignification he has attached to it himſelf, flatly contradicts the former aſſertions.

The

The *Palpi* are nearly of equal length, the anterior affixed to the back of the maxillæ, and the poſterior to the middle of the lip, the former conſiſting of four joints and the latter of three. Fabricius ſays, that the palpi are filiform, and all their joints cylindrical, and of the ſame ſize. This may be true as to the hinder palpi, but it is not equally ſo in regard to the foremoſt, as theſe latter have the middle joints veſicular and incraſſated in the male, and obconical with the terminal one much larger in the female.

The *Mandibulæ* are toothleſs and without ſheaths.

The *Lip* is cylindraceous, elongated, and contracted where the palpi are inſerted, and above them bifid.

The *Thorax* is flat, but marked with no inequalities, being neither depreſſed nor excavated.

The *Elytra* are rounded at the end, and neither bent down there, nor at the exterior margins.

The *Abdomen* is furniſhed on the ſides with papillary folds.

The *Tarſi* of the fore feet have five joints, but thoſe of the hinder feet only four.

Theſe few remarks may be ſufficient to ſhew that *Cerocoma* is as different a genus from *Pauſus* as can be ſuppoſed, and perhaps much more ſo than many which Fabricius has eſtabliſhed. Having thus far ſettled the generic character, I ſhall now proceed to the hiſtory and deſcription of the ſpecies in particular.

1. PAUSUS *microcephalus.*

This, Linné ſays, "was ſent to him by Dr. Fothergill of London, in a collection of inſects chiefly from North America and Guinea;" which in fact is nothing more than ſaying, that it may be a native of

of either of thoſe countries, or of both, or of neither; in one word, that its *habitat* was not known to him; and therefore he very prudently avoided aſſigning to it any.—This being the caſe, it is quite unaccountable how Fueſsly, Gmelin, Herbſt and Fueſsly's tranſlators could do it, without ſuppoſing a miſrepreſentation of Linné's text, as I am certain they knew nothing of the inſect, but what they had learned from his diſſertation.

Fueſsly tells us, "it was found amongſt a number of other inſects which the celebrated Dr. Fothergill of London had gathered in North America." But neither was Dr. Fothergill ever in America, nor is this inſect a native of that country, as far at leaſt as we yet know. This double blunder has nevertheleſs been faithfully tranſcribed by Herbſt; but Gmelin has ſatisfied himſelf with only the wrong *habitat*. Fueſsly's tranſlators have made two alterations in his text; the one equally erroneous as the original, in ſaying that this ſpecies was found in a collection of inſects from South America and the other; a real amendment, in excluding the ſtatement of Dr. Fothergill's having collected it himſelf in America.

Thunberg has very properly not attempted to ſay from whence it came; but Fabricius mentions Africa, from the authority of the cabinet of the Right Hon. Sir Joſeph Banks, Bart. K. B. and I have no doubt but that this is its true native country; not however the whole continent of Africa, but its weſtern coaſt, within the Tropics, on this ſide of the Line; at leaſt it is certain that the two ſpecimens of it now in London, one belonging to Sir J. Banks, and the other to Mr. Drury, were both ſent from thence by Mr. Smeathman. And it is ſo much the more probable that the inſect Linné got, likewiſe came from him; for I underſtand he was particularly patronized by Dr. Fothergill, and amongſt other curioſities alſo ſent him many inſects from that part of Africa which he viſited.

Now I find from thoſe of his manuſcript papers which Mr. Drury obligingly has permitted me to peruſe, that though he often travelled to different places between Iſles de Loſs and Sherbro', ſtill he reſided chiefly at the Bananas;—and therefore I think we ſhall not be much miſtaken, if we conſider this iſland, or the adjacent part of Sierra Leone, as the only native country hitherto known of P. *microcephalus*, this rare inſect, of which there are no more to my knowledge now exiſting in Europe than the three ſpecimens before-mentioned, all of which I have ſeen, but in a very different manner; for, of the Linnæan one, now in the poſſeſſion of Dr. Smith at Norwich, I had only a curſory view, at a time when I entertained no idea of deſcribing it; but the other two I have been allowed to examine and compare carefully. And as the figures annexed to Linné's diſſertation, though upon the whole of merit, were found to be capable of conveying a wrong notion of the true ſtructure of the antennæ, and principally of their ſuperior joint; Sir J. Banks did me the favour of granting me leave to have his ſpecimen drawn in different ſizes and poſitions.

Linné deſcribes this inſect as *niger elytris piceis*, Thunberg and Gmelin as *totus niger*, and Fabricius as *fuſcus*. Herbſt calls it *ater*, but figures the elytra piceous, and the reſt of the body blackiſh-cinereous; and thus makes it very curiouſly reſemble an harlequin. As to Fueſsly, he has only copied Linné's words; but in the French edition both *niger* and *piceus* are tranſlated by *noire*.—Hence we find that this inſect has been deſcribed now with one colour and now with another, and ſometimes as having two colours, though it does not poſſeſs but one, and that almoſt uniform. This is a ſingular fact, and a ſtriking inſtance of authors not knowing the true ſignification of Linné's terms.

It is not very uncommon in our days to ſee *ater* and *niger*, *piceus* and *fuſcus*, uſed promiſcuouſly: but it was not ſo originally with Linné; for, by *ater* he meant a colour of the blackeſt kind; by *niger*, another of black and brown mixed together; and by *piceus*, ſtill another of a lighter caſt, or with a greater portion of brown. As to *fuſcus*, it was a dark colour, compoſed of a mixture of black, brown, and cinereous. Having once aſked him the difference between *ater* and *niger*, I received this explanation from himſelf. It muſt therefore be genuine; and if we apply it to the preſent caſe, we ſhall find it agree admirably well, for the colour of P. *microcephalus* is a dark brown, but underneath and on the forepart bordering on blackiſh; and of courſe Thunberg has approached very near the truth in calling it *niger*, though I would rather give it the name of *piceus*.

Fabricius, in pointing out the ſpecific difference of this inſect, and ſpeaking particularly of its antennæ, ſays that their clava is *irregularis*. This word not being otherwiſe defined, it muſt here be taken in the ſenſe in which it is commonly uſed, and then it conveys the idea of the clava being of a ſhape either not always uniform, or deviating from the ordinary rules of nature. But neither is the caſe, for all that I have ſeen have been quite alike, and an oblong ſpheroid is not a very uncommon form to be met with in nature; P. *ſphærocerus*, both the *Pauſi* of Thunberg, and *Cerocoma ruficollis* of Fabricius, having, beſides ſomething ſimilar to it, the upper joint of their antennæ differently ſhaped from thoſe of other inſects.

After theſe details of the hiſtory of P. *microcephalus*, I ſhall now ſtate the chief differences between it and P. *ſphærocerus*.

It is of the ſame length, but ſomewhat broader acroſs the elytra, and of a much darker colour, being alſo very little ſhining.

The

The *Head* is uncommonly ſmall and without a horn, its annular baſe-part higher than the foremoſt; the *clypeus* bipartite, and the jugular *triangle* minute.

The *Eyes*, being as dark as the ſurrounding parts, cannot be diſcovered but by a large magnifier, and then they appear to be of a water-colour. The angles of the brim of the ſocket are large, the hinder one being raiſed to the height of the eye.

The *Pivots* of the *antennæ* are black, very bright, and eaſily taken for eyes. The *under-joint* is furniſhed with a wart on the inner margin of the top, covered with papillary or cartilaginous hairs. The *upper-joint*, or the clava, is dotted, much greater than the head, and of the ſhape of an oblong ſpheroid, being in *front* rounded and compreſſed with the carina raiſed into a ſharp edge, provided on the *vertex* with four tubercles ſet in a row and tipped with hairs, and elongated *behind* into an obtuſe tube, laterally compreſſed, above depreſſed, and underneath having a knob, which, in moving, touches the bundle of hairs on the top of the under-joint. The *pedicle* is long and crooked, its upper part being broader, compreſſed, and keeled in front.

The *interior Palpi* are of a lanceolated-oblong ſhape, and furniſhed with very minute hinges.

The *Mandibulæ* have ſmall hinges, and the inferior ſheath much larger than the ſuperior.

The *Thorax* is broader than the head and very uneven, the two parts being entirely ſeparated by a tranſverſely ſurrounding furrow, the *foremoſt* above and on the ſides elevated to a ſharp edge like a collar, and the *hinder* one cut out in the middle into a cavity, which, obtuſe behind, and dilatated and deepened before, is encompaſſed on the ſides with diverging and outwardly declining lobes, being

at their top rounded, and provided with ſhining hairs of a fulvous colour, and incurved downwards.

The *Elytra* are without dots, and rather longer than the abdomen. The folds of the exterior borders, and the tubercles on the outer angles of the ends, are both larger than thoſe of P. *ſphærocerus.*

The *Under-wings* are quite ſooty, and without the leaſt gloſſineſs.

The *Abdomen* has the terminal ſegment very retuſe, and the margin of the next before it viſibly raiſed.

The *Hinder-feet* are a little ſhorter than the others. The *thighs* of theſe feet are larger than thoſe of P. *ſphærocerus.* The *legs* of the four foremoſt feet are linear, but thoſe of the two hindmoſt ones nearly lanceolated, being alſo ſomewhat broader. The joints of the *tarſi* are exceedingly difficult to be diſtinguiſhed.

2. PAUSUS *ſphærocerus.*

I had been in Africa almoſt three years before I happened to meet with this remarkable little inſect, and then it was quite accidentally. There was a houſe building for the Governor, on an eminence called Thornton-hill, at the South end of Freetown, in Sierra Leone; and in the beginning of the year 1796, ſeveral apartments having been got ready ſo as to be habitable, one of them was allotted to me, and I removed into it in the end of the month of January.

I had not reſided there many days, when one evening having juſt lighted my candle and begun to write, I obſerved ſomething dropping down from the ceiling before me upon the table; which, from its ſingular appearance, attracted my peculiar attention. It remained for a little while quite immoveable, as if ſtunned or frightened, but began ſoon to crawl very ſlowly and ſteadily. I then caught it, and, from the remembrance I had of the Linnæan ſpecies, I directly took it for a non-deſcript of this genus.

Some few days after, coming into my room from ſupper with a light in my hand, and having put it upon the table, there inſtantly fell another down from the ceiling. The third I was favoured with by the then Governor, Mr. Dawes, who informed me that it had dropt down before him on the table, juſt when he had entered his room and was going to write. The other three which I afterwards collected, were alſo got upon ſimilar occaſions; and from thence I thought I had ſome reaſon to conclude, that it is a nocturnal animal, that it becomes benumbed by candle light, that it lives in wood and prefers new built houſes, &c. After the end of February I never ſaw any more.

The laſt which I caught I put into a box, and left confined there for a day or two. One evening going to look at it, and happening by chance to ſtand between the light and the box, ſo that my ſhadow fell upon the inſect, I obſerved, to my great aſtoniſhment, the globes of the antennæ, like two lanthorns, ſpreading a dim phoſphoric light. This ſingular phenomenon rouſed my curioſity, and, after having examined it ſeveral times that night, I reſolved to repeat my reſearches the following day. But the animal, being exhauſted, died before the morning, and the light diſappeared. And afterwards, not being able to find any more ſpecimens, I was prevented from aſcertaining the fact by reiterated experiments at different times; which I therefore muſt recommend to other Naturaliſts, who may have an opportunity of viſiting Sierra Leone, requeſting that they would particularly inquire into this curious circumſtance.

I ſhall now only add ſome few remarks, ſhewing in what manner this new ſpecies moſt eſſentially differs from the old one.

Not being quite ſo broad, it looks as if it were longer, and more cylindrical.

cylindrical. It is alſo of a lighter or cheſnut colour, and all over very gloſſy.

The *Head* is larger, but its annular baſe part ſmaller and contracted. It is furniſhed with a little horn in the middle between the eyes, which is ſtraight, conic, and tipped with a tuft of cartilaginous hairs. The *clypeus* is only depreſſed, and the jugular *triangle* wider.

The *Eyes* are large and very evident, thoſe of the male black, though in a certain light appearing greeniſh; but thoſe of the female are like pearls, or as if they were covered with a cryſtalline membrane. The angles of the brim of the ſocket are ſmall and rounded at the top, and the hinder one lower than the eye.

The *Pivots* of the *antennæ* are not ſo diſcernible, being of the ſame colour as the ſurrounding parts. The *under-joint* is without any hairy papilla or wart. The *upper-joint*, or the clava, is of the ſize of the head, quite globular, and reſembles an inflated bladder, being almoſt pellucid, and of a light fleſh colour. The *keel* is nothing more than a raiſed line, finiſhing on the vertex in only one cheſnut brown tubercle covered with cartilaginous hairs. Behind there is a little conical ſhining *hook*, of the ſame colour and with the ſame ſort of hairs bending outwardly, being of equal length with the horn on the head, but narrower. The *pedicle* is ſhort, ſtraight and cylindraceous.

The *interior Palpi*, furniſhed with very viſible hinges, are a little thicker towards the top, but look in ſome directions as if they were filiform.

The *Mandibulæ* have large hinges, and the ſuperior ſheath almoſt as long as the inferior one, and nearly cylindrical.

The *Thorax* is of the ſame breadth as the head, and not very uneven, the two parts being ſeparated by a furrow only on the ſides

sides and underneath, the *foremost* above and on the sides convex resembling an annular segment, and the *hinder* one impressed in the middle with a mark somewhat like two small diverging wings of a blackish silvery colour.

The *Elytra* are shorter than the abdomen, and minutely punctated.

The *Under-wings* are of a shining and changeable violaceous colour, and not very dark.

The *Abdomen* has the terminal segment a little convex, and in the female more so than in the male. Underneath, the third and last segments are darker than the others.

The *Feet* are all of equal length. The *thighs* have smaller appendages than those of P. *microcephalus*. The *legs* are at the top broader, truncated and hairy, having the exterior margin drawn out into a sharp lamina, on each side of which there is a row of small diverging hairs, which make the leg appear as if it were canaliculated, at least in a certain light, and with a small magnifier. On the interior margin there is but one row of hairs, and on the hinder legs I do not observe any. The *tarsi* are longer than those of P. *microcephalus*, and have also both the joints and the claws much more distinct.

Having thus given a sufficiently detailed account of the genus *Paussus*, and its two species, which I have seen myself, as to their history, their generic resemblance, and specific difference, I shall now endeavour to describe them in a shorter and more scientific language.

In settling his genera of insects, Linné attended chiefly to the *antennæ* and their structure; but he took occasionally into consideration also other parts, as the *head*, the *thorax*, the *elytra*, &c. &c. Fabricius has adopted a different method, and made out the generic

deſcriptions only from the mouth and the organs for feeding, or what he calls *Inſtrumenta cibaria.* Theſe deſcriptions he has publiſhed in his *Genera Inſectorum*, under the name of *Characteres naturales*, in imitation of what Linné had done before in regard to plants.

But as a *Character naturalis*, in whatever manner it may be made out, does not contain the whole deſcription of a genus, or the whole account of the agreement between its ſpecies, I would call the remaining part *Habitus naturalis*, and from the leading points of this double ſtatement I would form a *Character artificialis*, to be put before the genus in the text of the book, leaving what is named *Character eſſentialis*, or the moſt diſtinguiſhing marks from other genera, out of *Character naturalis*, to be inſerted as uſual in the methodical arrangement at the head of the claſs.

But *Pauſus* is a genus ſo very unlike all others hitherto known, that I cannot find a place for it in this arrangement. Gmelin has put it in the diviſion, *Antennis clava ſolida*; and Fabricius with *Cerocoma* in another, *Antennis moniliformibus.* But, as I have proved above, it does not belong to either; nor can it be placed amongſt Fabricius's genera *Antennis extrorſum craſſioribus*, becauſe theſe expreſſions, without being otherwiſe defined, are ſo vague that they may be equally applied to all inſects with clavated antennæ, as it has been done not only by Linné, but alſo by Fabricius himſelf in his *Philoſophia Entomologica.* I am therefore under the neceſſity of making a new diviſion for *Pauſus.*

DESCRIPTIO

DESCRIPTIO GENERIS.

CHARACTER ESSENTIALIS.

***** *Antennis clava integra inflata.*

PAUSUS. Antennæ biarticulatæ, clava uncinata pedicellata mobili.

CHARACTER ARTIFICIALIS.

PAUSUS. *Antennæ* biarticulatæ, articulo ſuperiore maximo inflato uncinato pedicellato: pedicello in cavitate articuli inferioris mobili.

Caput porrectum: gula triangulo convexo inſtructa.

Thorax anguſtus inæqualis ſcutellatus.

Elytra flexilia deflexa truncata.

Pedes antici pectoris parti anticæ affixi: femoribus appendiculatis: tarſis quadriarticulatis.

CHARACTER NATURALIS.

Palpi quatuor inæquales obtuſi, baſi trianguli gularis affixi.

interiores medii, triplo longiores, divergentes, intus plani extra convexi, baſi biarticulati, interius paulòque altius collocati.

exteriores laterales, minuti, erecti, ſetacei, compreſſi, articulis deſtituti, margini exteriori baſeos trianguli gularis inſerti.

Mandibulæ porrectæ arcuatæ accuminatæ forcipatæ, baſi biarticulatæ, dein e vaginis duabus corneis introrsùm dilatatis truncatis, quarum infera latior, bidenticulatæ, et tandem hamulo vaginis anguſtiore cylindraceo carneo terminatæ.

Maxillæ apice teretes integerrimæ unguiculatæ forcipatæ.

Labium palpis interioribus brevius, ſubquadratum, membranaceum, carinatum, apice integrum ciliatum.

Antennæ biarticulatæ: articulo *inferiore* parvo ſubrotundo utrinque truncato; *ſuperiore* maximo inflato in *capitulum* integrum, ante et extraversùs carinatum: carina a baſi ad verticem tuberculatum ducta, ponè et introrsùm tubo vel hamulo inſtructum, et ſubtùs pedicellatum: pedicello baſi globoſo nitidiſſimo: globo cavitati articuli inferioris versùs marginem ejus apicis exteriorem inſerto, et ad ſuperiorem articulum rotandum accommodato.

Metamorphoſis et victus nondum innotuerunt.

HABITUS NATURALIS.

Animal parvum, ab apice antennarum ad finem abdominis tres circiter lineas longum et tranſverſim per elytra vix unam latum, ſupra depreſſum, in parte antica anguſtius, qua poſteriora fermè cylindraceum, lævè glabrum unicolor nitidulum tardigradum, Africam occidentalem inter Tropicos ſitam inhabitans.

Caput parvum, thorace multò minus breviuſque, ſubrotundum, porrectum, baſi quaſi annulo cinctum. *Clypeus* minutus. *Gula* triangulo elato convexo: baſi inter oculos ducta.

Oculi majuſculi laterales tranſversè oblongi prominuli: margine acetabulorum antico in angulum horizontalem, poſtico in perpendicularem producto; unde facultas videndi non niſi in partem anticam.

Antennæ: articulis inferioribus ferè parallelis, ſuperioribus valdè divergentibus, mobiles ope tuberculi oculum referentis globoſi.

boſi nitidiſſimi, quod margini exteriori baſeos articuli inferioris affixum, in cavitate capitis ante oculos inter angulum eorum acetabuli anticum et clypeum rotatur.

Thorax partibus duabus diſtinctis inæqualibus: *antica* dorſo emarginata altiore et lateribus etiam paulò magis dilatata, *poſtica* latiore, dorſo prorsùm depreſſa vel excavata, cæterùm cylindracea, conſtans anguſtus ſcutellatus: *ſcutello* minuto triangulari.

Elytra linearia planiuſcula tenuia flexilia: *baſi* ſcutellum continente valdè coarctata, etiam thorace paulò anguſtiora; *humeris* utrinque antrorsùm aliquantùm protuberantia; *margine* exteriore longitudinaliter quaſi carinata et dein adeò deflexa ut latera abdominis tota tegant, plica in anticum latiore; *futuris* parùm marginata; *apice* truncata inflexa et angulo exteriore, ubi partes deflexæ laterales et terminales concurrunt, exciſa in ſinum minutum, cujus margines elevati veluti tubercula compreſſa apparent.

Abdomen lineare: ſegmentis quinque, *ſupra* planiuſculum, colore dilutè ferrugineo vario: ſegmento ultimo maximo deflexo obſcuro ponè rotundato marginato; *ſubtus* in antica parte inter pedes medios et ultimos lamina convexa notatum, poneversùs gibbum: ſegmentis primo et quarto majoribus, ponè femora pedum poſticorum depreſſum: foſſula circulo e punctis minutis approximatis confecto circumdata.

Pedes ſubæquales, antici pectoris parti anticæ, medii ad baſin ventris et poſtici illi medio inſerti. *Femora* inermia, lanceolato-oblonga, compreſſo-gibboſa, incraſſata præſertim pedum poſticorum, ut tibiæ extendi atque contrahi poſſint apice margineque interiore ultra medium canaliculata, et ut pedes toti introrsùm moveri queant baſi appendiculata: appendice

pallidiore, acetabulo ſubjacenti adaptata, pedum poſticorum maxima ovali in aciem obtuſam compreſſa, reliquorum parva ſubrotunda. *Tibiæ* compreſſæ, margine utroque pilis breviſſimis inſignitæ. *Tarſi* anguſti teretiuſculi 4-articulati unguiculati: articulis minutis, tribus æqualibus, ultimo longiore, apice utrinque pilo inſtructis, articulis vix internendis: unguibus duobus longiuſculis apice incurvatis divergentibus.

DIFFERT A CEROCOMA.

Habitatione æquinoctiali in domibus.
Corpore glabro, antico anguſtiore.
Capite porrecto, gula triangulo notata.
Antennis magnis biarticulatis: articulo ſuperiore maximo, uncinato, pedicellato, mobili.
Palpis baſi trianguli jugularis affixis, interioribus multò longioribus.
Mandibulis vaginatis denticulatis.
Labio ſubquadrato, carinato, integro.
Thorace anguſto inæquali: partibus duabus diſtinctis.
Elytris margine circumcirca deflexis, apice ſinuatis truncatis.
Abdomine plicis papilliſque lateralibus deſtituto.
Pedibus anticis anticæ pectoris parti affixis, femoribus appendiculatis, tarſis omnibus quadriarticulatis.

DESCRIPTIO SPECIERUM.

1. PAUSUS *microcephalus*, capite mutico, clava oblongo-ſphæroidea, elytris longitudine abdominis impunctatis, tibiis linearibus.

Pauſſus microcephalus, *Linn. Diſſ. Big. Inſect.* p. 6. *ſq.** Tab. ann. fig. 6—10. *Fueſsl. Arch. Inſect.* Plag. 3. p. 1. *ſq.** Tab. 13. *ed. Gall.* p. 42.* Tab. 13.

Paufus

Paufus microcephalus, totus niger, *Thunb. Act. Stockholm*, 1781. p. 170.
Paufus microcephalus, *Gmel. Syft. Nat.* Tom. 1. P. 4. p. 1737.*
Paufus microcephalus, ater capite minutiffimo, thorace anguſto depreſſo, elytra picea lævia inflexa teuia (tenuia): *Herbſt. Syſt. Inſect. Coleopt.* P. 4. p. 100. *ſq.** Tab. 39. fig. 6. a. b.
Cerocoma microcephala, antennis biarticulatis: clava irregulari dentata maxima, corpore fuſco, *Fabr. Entom. Syſt.* Tom. 1. P. 2. p. 82.
Habitat in Inſula Bananas ejuſque vicinitate. Muſ. Banks, Smith, & Drury.
Piceus in parte antica et infera paullo obſcurior, ſupra parùm ſubtus magis nitidus.
Caput minutiſſimum muticum: *parte* poſtica annulari altiore, *clypeo* bipartito, *triangulo* jugulari minuto.
Oculi mediocres, ſed adeo obſcuri, ut diſtingui nequeant niſi lente valdè aucti, et tum ſaturatæ glauceſcentes apparent: *angulis* acetabulorum magnis, poſtico oculis ferè altiore.
Antennæ: tuberculo ad baſin *motatorio* nigro nitidiſſimo, ſpeciem oculi omninò præ ſe ferente; articulo *inferiore* obſoletè punctato, apiciſque margine ſuperiore introrsùm verruca piloſa inſtructo; *ſuperiore* caput magnitudine excedente, oblongo-ſphæroideo, punctato, *antè* compreſſiuſculo: carina in aciem acutam elevata, *vertice* denticulis quatuor piliferis in ſeriem carina paulò exteriorem adinſtàr criſtulæ diſpoſitis notato, *ponè* in tubum obtuſum ſupra depreſſum ſubter tuberculatum apice compreſſum ſuper articulum inferiorem producto, *ſubtùs* pedicello longo adſcendente ſupernè compreſſo et antè carinato, infernè anguſtiore tereti nigro.
Palpi interiores lanceolato-oblongi: articulis minutis.

Mandibulæ:

Mandibulæ: articulis parvis; vagina inferiore superiorem magnitudine multùm excedente.

Labium: carina sulcata et apice medio quasi mucronato.

Thorax capite multò latior et maximè inæqualis: *partibus* duabus sulco transverso circumcirca ambiente omninò distinctis; *antica* supernè et lateribus in aciem acutam elevata, collari vel rotulam referente; *postica apice* utrimque rotundata pilisque fulvis nitidissimis deorsùm inflexis insignita, *medio* in fossulam prorsùm excurrentem dilatatam profundiorem excavata, *lateribus* extrinsecùs declivi, *poneversùs* margine convexo terminata.

Scutellum acutiusculum, reliquo corpore nitidius.

Elytra longitudine abdominis vel ferè longiora, punctis destituta: deflexu laterali latiore et marginibus futurarum finubusque tuberculatis in angulo apicis exteriore multò majoribus atque evidentioribus quàm insequentis speciei.

Alæ inferiores fuliginosæ et omni nitore expertes.

Abdomen retusum: margine postico segmenti penultimi elato; subtùs ponè pedes colore in cupreum vergente.

Pedes obsoletè punctati, postici aliquantò breviores. *Femora* pedum posticorum margine exteriore arcuata. *Tibiæ* apice muticæ lineares, pedum posticorum paulò latiores ferè lanceolatæ. *Tarsi* graciles: articulis difficillimè distinguendis.

2. PAUSUS *sphærocerus*, capite cornuto, clava globosa, elytris abdomine brevioribus punctatis, tibiis apice dilatatis.

Habitat in Sierra Leone: Freetown. Mus. Smith, Marsham et meum. Januario et Februario noctuabundus ambulat, luce admissa cæcutit, delabitur et aliquamdiu immobilis remanet. Globi antennarum phosphori videntur, atque materia tenui liquida repleti.

Castaneus

Castaneus nitidissimus, præcedente paulò anguſtior, unde etiam longior apparet et magis cylindraceus.

Caput majus cornutum: *parte* posticâ annulari minore coarctata; *cornu* medio parvo conico erecto pilis cartilagineis terminato; *clypeo* solum depresso; *triangulo* jugulari majusculo.

Oculi admodùm magni, valdè conspicui, atri, sed in certa quadam luce viresçente tincti: *angulis* acetabulorum parvis apice rotundatis, posticis oculis multò humiliore.

Antennæ: tuberculo ad basin *motatorio* concolore, et sic non adeo manifesto; articulo *inferiore* punctis atque verruca destituto; *superiore* magnitudine capitis, sphærico, vesicæ inflatæ simili, semipellucido, incarnato, *carina* minuta vertice tuberculo unico pilifero castaneo nitido terminata instructo, *ponè* in hamulum conicum, longitudine cornu capitis sed graciliorem, apice pilis in externum flexis notatum, castaneum nitidissimum paulùm extra articulum inferiorem producto, *subtùs* pedicello brevi cylindraceo atro.

Palpi interiores versùs apicem aliquantùm incrassati, sed certo adspectu cylindracei: articulis majusculis.

Mandibulæ: articulis magnis; vagina superiore parùm breviore, et fermè cylindracea.

Labium apice deflexum et ferè truncatum: carina sulco destituta.

Thorax latitudine capitis et parùm inæqualis: *partibus* duabus sulco non nisi lateribus et subtus exarato distinctis; *antica* superiè et lateribus convexa, annulum vel segmentum referente; *posticâ* margine *anteriore* signo medio depresso nigresçenti-glauco duabus alis minutis apice divergentibus non adeo dissimili impressa, *posteriore* parùm elevata sed spatio lato: stria transversa media, instructa.

Scutellum obtusiusculum ferè inconspicuum.

Elytra abdomine breviora, obſoletè punctata.

Alæ inferiores colore violaceo vario nitido.

Abdomen apice convexiuſculum nigrum; ſubtus ſegmentis tertio et ultimo nigreſcentibus obſoletiſſimè punctatis.

Pedes omnes æquales impunctati. *Femora* baſi atra: appendicibus minoribus quam P. *microcephali*. *Tibiæ* baſi nigricantes, versùs apicem latiores compreſſiores, ipſo apice pilum utrinque gerentes, truncatæ, margine exteriore ſerie pilorum duplici, interiore unica et pedum poſticorum nulla inſtructæ. *Tarſi* longiores quam præcedentis ſpeciei: articulis etiam multò evidentioribus unguibuſque majoribus.

Fœmina differt *oculis* cryſtallinis; *palpis* interioribus paulò anguſtioribus, exterioribus glauceſcentibus; *mandibulis* brevioribus: vagina infera anguſtiore; *ſcutello* minore; *abdomine* longiore, apice convexo piceo; *femoribus* pedum poſticorum aliquantò gracilioribus; cæterùm ſimillima.

To theſe inſects, now deſcribed, there are ſome others which ſeem to be nearly related; but whether they are exactly of the ſame genus I cannot determine, not knowing how far they agree in the particulars of the generic character as above ſtated. But that they may not be overlooked hereafter, I ſhall here inſert them. They are the three following:

1. *Pauſus ruber*: totus rufeſcens, *Thunb. Act. Stockh.* 1781. p. 170.*
   Pauſus ruber, totus rufeſcens, thorace anticè eroſo; elytra truncata, margine exteriori deflexa, *Herbſt. Syſt. Inſect. Coleopt.* P. 4. p. 101.*
   Habitat in Capite Bonæ Spei.

2. *Pauſus lineatus*: rufeſcens linea elytrorum fuſca, *Thunb. Act. Stockh.* 1781. p. 171.*, Tab. 3. fig. 4. 5.

Pauſus

Paufus lineatus, capite collo cylindrico a capite (thorace) ſeparato; elytra linearia, linea in medio lata fuſca, *Herbſt. Syſt. Inſect. Coleopt.* P. 4. p. 102.* Tab. 39. fig. 7. a. b.

Cerocoma lineata, antennis biarticulatis: clava elongata integra, fuſca linea nigra, *Fabr. Ent. Syſt.* Tom. i. P. 2. p. 82. *sq.*

Habitat in Capite Bonæ Spei.

β. *Cerocoma ruficollis*, antennis biarticulatis: clava elongata integra, nigra thorace elytrorumque ſtriga ferrugineis, *Fabr. Ent. Syſt.* Tom. i. P. 2. p. 83.*

Habitat - - - - - - Dom. Lund.

Before I conclude, I muſt recommend to Gentlemen who may have an opportunity of ſeeing P. *microcephalus* and P. *ſphærocerus* alive, to inveſtigate their nature and metamorphoſes, to examine carefully their inſtruments for feeding, and to enquire into the interior ſtructure of the upper-joints, or the clavæ of their antennæ, as well as into the peculiar quality of giving light, which the balls of P. *ſphærocerus* ſeem to poſſeſs, &c. &c.

EXPLANATION OF TAB. XXII.

PAUSUS *microcephalus.*

Fig. 1. the natural ſize.

Fig. 2. magnified, ſeen from above.

a a. the four tubercles on the vertex of each of the clavæ or upper-joints of the antennæ.

b b. the hooks of the clavæ, with their interior knob.

c. the pedicles of the ſame, with their balls at the baſe.

d. the lower joints of the antennæ.

e e. the eyes.
f. the raiſed hinder part of the head.
g. the elevated fore-part of the thorax.

Fig. 3. one of the tubercles of the clava, tipped with hairs, greatly magnified.

Fig. 4. the head, ſeen below, alſo much magnified.
a. the raiſed edge of the clava.
b. the hairy warts on the top of the lower joints of the antennæ.
c. the tops of the maxillæ.
d. the labium.
e e. the eyes.
f f. the jugular triangle.

Fig. 5. greatly magnified.
a. the mandibulæ, with their teeth and hinges.
b. the exterior palpi.
c. the interior ones, with their hinges.

PAUSUS *ſphæroceru*s.

Fig. 1. the natural ſize.
a. the horn on the head.

Fig. 2. magnified, ſeen from above.
a a. the tubercles on the vertex of the clava or upper-joint of the antennæ.
b b. the eyes.
c c. the contracted hinder-part of the head.
d d. the elevated fore-part of the thorax.
e e. the raiſed poſterior margin of the ſegment next to the terminal one.

Fig.

Linn. Trans. IV. tab. 22 p. 274.

Fig. 1.

Fig. 2.

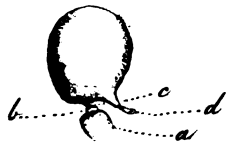


Fig. 3.

Fig. 4.

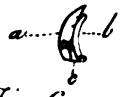


Fig. 6.

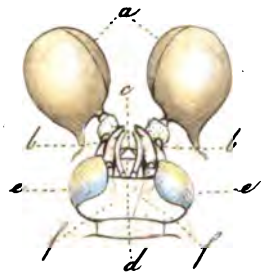


Fig. 5.

Pausus sphærocerus.

Fig. 1.

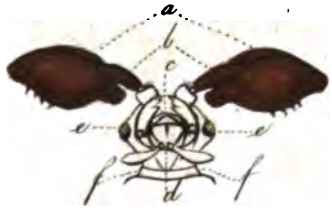


Fig. 4.

Fig. 5.

Fig. 3.

Fig. 2.

Pausus microcephalus

Fig. 3. one of the antennæ, greatly magnified.
- *a.* the lower-joint.
- *b.* the hook of the upper one, or of the clava.
- *c.* its pedicle.
- *d.* the ball of this pedicle.

Fig. 4. the hairy tubercle of the clava, very much magnified.

Fig. 5. the head, ſeen below, alſo greatly magnified.
- *a.* the raiſed line of the clava.
- *b b.* the balls or pivots of the whole antenna.
- *c.* the tops of the maxillæ.
- *d.* the labium.
- *e e.* the eyes.
- *f f.* the jugular triangle.

Fig. 6. greatly magnified.
- *a.* the mandibulæ, with their hinges.
- *b.* the exterior palpi.
- *c.* the interior ones, with their hinges.

XXIII. *Observations on the British Species of Bromus, with Introductory Remarks on the Composition of a Flora Britannica. By James Edward Smith, M.D. F.R.S. P.L.S.*

Read April 3, 1798.

WHEN I firſt found myſelf in poſſeſſion of the herbarium, manuſcripts, and library of Linnæus, ſeveral great objects preſented themſelves to my view, all tending to the advancement of that ſtudy to which I then, in my own mind at leaſt, entirely devoted myſelf. The eſtabliſhment of a Linnæan Society, and the elucidation of the plants of Great Britain, were among theſe objects. The ſucceſs of the former, from the concurrence of talents and zeal with which it has been ſupported, has exceeded my moſt ſanguine hopes: happy will it be if the other object, the attainment of which muſt neceſſarily depend more on time and perſonal application, ſhould ever be as completely accompliſhed.

Conſidering the attention that has already been given to Britiſh plants, it would appear that the ſubject muſt be nearly exhauſted, and that nothing could be more eaſy than to compile a perfect catalogue of them; ſuch ſlight errors in nomenclature as already exiſt, being at once to be removed by turning to the Linnæan herbarium. Perhaps this might be the caſe if we had fewer publica-

tions

tions upon the ſubject already. It is in many inſtances eaſier to detect truth itſelf, than to trace the cauſes of error.

Dr. Merrett, in his *Pinax*, muſt be conſidered as the father of our indigenous botany, notwithſtanding the errors of that work are ſuch that Ray has called it "Dr. Merrett's bungling *Pinax*." It may be queſtioned, however, whether any of us, who preſume upon a higher degree of eſtimation as Naturaliſts, if landed on an unexplored country, with only ſuch helps as he had, would fall into fewer miſtakes, or be guilty of fewer omiſſions. However this may be, the work of Merrett was ſo completely ſuperſeded by the labours of the immortal Ray, that we need in no inſtance recur to it as authority. The *Synopſis* of Ray, traced through its various editions, having been written from real obſervation, and from abſolute original ſcrutiny of almoſt every Britiſh plant, is the foundation of our preſent knowledge of the ſubject. He examined every plant recorded in his work, and even gathered moſt of them himſelf. He inveſtigated their ſynonyms with conſummate accuracy; and if the clearneſs and preciſion of other authors had equalled his, he would ſcarcely have committed an error. It is difficult to find him in a miſtake or miſconception reſpecting Nature herſelf, though he ſometimes miſapprehends the bad figures or lame deſcriptions he was obliged to conſult.

In tracing the botanical hiſtory of Britiſh plants, I therefore conſider Ray as the fountain-head of authority, but it is only Ray himſelf. Dillenius, the highly reſpectable editor of the laſt edition of the *Synopſis*, has, with commendable modeſty and diffidence, diſtinguiſhed from the original work all his own additions, being well aware of the danger of miſtakes. If he had not done ſo, the preceding edition of the work in queſtion, publiſhed in 1696, would have been our only reſource; for it cannot be concealed that Dillenius

has added ſeveral plants upon inſufficient grounds, either as ſpecies or natives, and has inſerted others, ſuppoſed to be new, that exiſt under other denominations in the original work. Indeed the changes he has made among the ſynonyms, not being always marked, and proving often erroneous, oblige us on that head ſtill to conſult the edition of 1696.

The *Synopſis* of Ray, as publiſhed by Dillenius in 1724, was the ſtandard book of Engliſh Botaniſts, till the works of Linnæus, more ſimple, compendious and perſpicuous, if not more free from error, than any that had before appeared, came into general uſe throughout Europe. England, long accuſtomed to take the lead in ſcience, would have ſeemed ſo far in a ſtate of barbariſm, if her vegetable productions had remained unarranged according to the new ſyſtem; and ſhe would have been of as little importance in Natural Science as France, partly from the ſame cauſe, and partly from her dancing after the bubbles of glittering theory, has till lately been.

Dr. Hill, a ready and experienced writer, and Mr. Hudſon, a more accurate and practical obſerver, each undertook, about the ſame time, to make the pupils of Ray, already become veterans in his ſervice, ſubmit to Linnæan diſcipline. Many of them found the advantage of it; ſome proved refractory, and are forgotten; while a multitude of new diſciples, allured by the attractiveneſs of the new ſyſtem, and the doctrines by which it was ſupported, have been daily advancing its utility and celebrity. The *Flora Anglica* of Hudſon has, almoſt from its firſt publication, to this hour, been the claſſical book of Engliſh Botaniſts. It has been the guide and ground-work of local Floras, as the *Flora Cantabrigienſis* of Mr. Relhan, *Flora Oxonienſis* of Dr. Sibthorp, and even the *Flora Scotica* of Mr. Lightfoot; for I by no means intend to detract from the practical merit of the authors of any of thoſe works, when I aſſert, that

that they have in general adopted the ſynonyms of Linnæus and of Ray from the *Flora Anglica.* The work of Mr. Hudſon has alſo been the baſis of all publications beſides Mr. Lightfoot's, intended to make the Botany of Great Britain acceſſible to thoſe who could not read the Latin tongue, as Dr. Withering's *Botannical Arrangement*, and the vegetable part of Dr. Berkenhout's *Outlines.*

The authors juſt enumerated have followed the plan of Mr. Hudſon himſelf, in applying the names, and even deſcriptions, in foreign authors, to the plants of Ray; an unexceptionable method if thoſe authors were always correct, if we were certain they all ſpoke of the ſame plants under the ſame names, or quoted other writers without any miſapprehenſion. This however being by no means the caſe, a great maſs of error has been from time to time accumulating, which it requires more care and patience to remove than would be neceſſary to work out the whole ſubject afreſh. Mr. Hudſon commonly applies a Linnæan name to a plant, becauſe Linnæus has quoted Ray for it, or becauſe Haller, or Scopoli perhaps, has referred to Ray and Linnæus, while all three may chance to have intended a different ſpecies. He even copies ſynonyms of other authors from any of the above-mentioned, without looking at the books quoted; as may in many inſtances be proved by the errors of the preſs, and awkwardneſſes of citation, which he has retained. He is however entitled to great praiſe for new-modelling the ſpecific characters, when he found ſuch as Linnæus had given did not well ſuit our plants, and on this ground he may rank as an original author. His deſcriptions alſo, which are original, are characteriſtic and valuable. Dr. Withering and Mr. Relhan, in copying deſcriptions from other writers, have always faithfully cited the ſource from which every article was derived; ſo that when thoſe deſcriptions do not well accord, even with each

other, as it often happens, a Student may chooſe between them; preferring a deſcription of Curtis, Lyons, or Hudſon, to one of Haller or Scopoli, becauſe of the probability of the ſpecies theſe laſt writers deſcribed not agreeing with our Britiſh ones, or with thoſe of Linnæus. Haller indeed is far from correct in his Linnæan ſynonyms, ſo that I find it dangerous to quote him without very particular reaſons. But if there be ſo much uncertainty in compiled ſynonyms and deſcriptions, even when we are informed from whence they are derived, what ſhall we ſay to Mr. Lightfoot's plan of copying from all quarters without any acknowledgment at all? His book is made up of paſſages from Linnæus, Haller, Scopoli, Dillenius and Gmelin; and he is not by any means attentive to the agreement of thoſe paſſages with the native plants to which he applies them. If the writer of every *Flora* would give original deſcriptions or characters, from real wild ſpecimens, his work muſt be valuable; and on this account Dr. Withering's third edition becomes a book of firſt-rate authority, no deſcriptions being more juſt than his, as far as they go. For the ſame reaſon Mr. Curtis's *Flora Londinenſis*, though incomplete, ought to be ranked, independent of its excellent figures, next to Ray's *Synopſis* in original merit and authority upon Engliſh plants.

With theſe examples before me, to ſhun or to imitate, I have long laboured at the *Flora Britannica*; and it is evident that, on ſuch a plan as I have propoſed to myſelf, it cannot very ſpeedily be completed. By ſtudying original ſpecimens in the great collections at the Britiſh Muſeum and at Oxford, I hope to bring the ſynonyms nearer to perfection than they are at preſent, and have already cleared up many difficulties. Many of my diſcoveries are daily given to the world in the *Engliſh Botany*; and I appeal to their number, not from oſtentation, but as an apology for not having

more

more ſpeedily completed my whole taſk, in which ſo many points more remain to be inveſtigated.

By the above remarks, protracted perhaps to too great a length, I wiſh to introduce a botanical hiſtory of the Britiſh ſpecies of *Bromus*, a tribe of graſſes which, when examined, fully juſtifies all I have ſaid, and which could ſcarcely have been underſtood without a careful inveſtigation of the old herbariums, the errors in authors being ſo great and unaccountable as could not be believed without ſuch an inveſtigation.

GENERIC CHARACTER.

BROMUS. *Linn. Gen. Pl.* 36. *Juſſ. Gen.* 32.

Calyx bivalvis. *Spicula* oblonga, diſticha: *ariſta* infra apicem: *gluma* interior pectinato-ciliata.

All authors have found a difficulty in diſtinguiſhing this genus from *Feſtuca*, and ſome have united them. The ariſta being terminal in *Feſtuca*, and not ſo in *Bromus*, proves in moſt inſtances a ſufficient character, to which I beg leave to add, that the inner glume of the corolla in *Bromus* is fringed with ſtrong diſtant briſtly hairs, whereas that part in *Feſtuca* is either ſmooth or finely downy. There are nevertheleſs difficulties attending theſe marks, which I ſhall point out hereafter.

1. BROMUS *ſecalinus.*

Smooth Rye Brome-graſs.

B. paniculâ patente; pedunculis ſubſimplicibus, ſpiculis ovatis compreſſis decemfloris, floſculis diſtinctis teretiuſculis.

Bromus ſecalinus. *Linn. Sp. Pl.* 112.
B. polymorphus γ. *Hudſ.* 49. var. 2. *With.* 159.
B. vitioſus. *Weigel Obſ.* 4. *t.* 1. *f.* 2.
Feſtuca avenacea, ſpicis habitioribus, glumis glabris. *Raii Syn. ed.* 2. 261. *ed.* 3. 414.
F. graminea, glumis glabris. *Scheuchz. Agroſt.* 251. *t.* 5. *f.* 10.
Gramen avenaceum ſegetale majus, glumâ turgidiore. *Moriſ. Sect.* 8. *t.* 7. *f.* 16.

In arvis minùs frequenter. Fl. Julio.

Near Edwinsford, Caermarthenſhire, among the winter corn. *Sir J. Banks, Bart.* Fields in Suſſex. *Sir. T. Frankland, Bart.*

Radix fibroſa, annua. *Culmus* tripedalis, folioſus, erectus, ſimplex, teres, glaber. *Folia* linearia; ſupra, margineque præcipuè, piloſa; ſubtus ſcabra. *Vagina* læviuſcula. *Stipula* brevis, eroſa, piloſa. *Panicula* vix ſemipedalis, patens; ramis ſemi-verticillatis, rectiuſculis, angulatis, ſcabris, longitudine inæqualibus, plerumque ſimplicibus unifloris. *Spiculæ* ovatæ, ferè ellipticæ, compreſſo-planæ, floſculis 9 ad 12, baſi remotis, unde rachis flexuoſa, glabra, tota in conſpectum venit. *Calyx* inæqualis, muticus, glumis ellipticis, glabris, trinerviis, margine membranaceis. *Floſculi* teretiuſculi, glabri (rariùs pubeſcentes), albido-vireſcentes, nitidi; *gluma exterior* elliptica, turgida, nec depreſſa, obſoletè ſeptemnervia, margine apicem versùs parùm membranacea, ſub apice ariſtata; *ariſta* rectiuſcula, ſcabra, glumâ brevior: *gluma interior* longè anguſtior et tenuior, concava, mutica, margine pectinato-ciliata. *Semen* cylindricum, ſupra ſulco exaratum.

This

This ſpecies is not very common. It may eaſily be known by its broad oval compreſſed ſpikes, each conſiſting of not more than 10 or 12 cylindrical rather remote florets, almoſt always ſmooth, and drooping as they ripen from the length of their foot-ſtalks, which are for the moſt part quite ſimple.

2. BROMUS *multiflorus.*

Downy Rye Brome-graſs.

B. paniculâ patente; pedunculis ſubſimplicibus, ſpiculis ovato-lanceolatis compreſſis quindecimfloris, floſculis ſubimbricatis teretiuſculis.

Bromus multiflorus. *Weigel Obſ.* 2. *t.* 1. *f.* 1. *Gmel. Syſt. Nat. Linn.* 188.

B. ſecalinus. *Leers* 36. *t.* 11. *f.* 2. *Lightf.* 1086. *Linn. Fl. Suec. ed.* 2. 96. var. 2.

Feſtuca graminea, glumis hirſutis. *Bauh. Theatr.* 143. *Scheuchz. Agr.* 250. *t.* 5. *f.* 9.

In arvis rariùs. *Dill. in R. Syn.* 414. Fl. Julio.

Near Norwich. *Miſs Hancock.* Between Edinburgh and Newhaven.

Habitus præcedentis. *Culmus* glaber. *Folia* inferiora ſubtus nuda, ſupra ad margines ſubpiloſa; ſuperiora ſubtus brevi lanugine pubeſcentia, ſupra piloſa; omnia margine ſcabra. *Vagina* glabra. *Stipula* breviſſima, lacera, vix piloſa. *Panicula* ut in priore. *Spiculæ* uncíales, ovato-lanceolatæ, compreſſo-planæ, floſculis 12 ad 16, imbricatis, demùm ſubremotis. *Glumæ* omnes plerumque molliſſimè pubeſcentes, rariùs glabræ.

There is certainly great affinity between this ſpecies and the preceding, and they have been accordingly confounded, not only by Scopoli and Hudſon, who have united ſeveral more diſtinct ſpecies into one, under the name of *polymorphus*, but alſo by moſt other authors. Scheuchzer and the accurate Weigel have however diſtinguiſhed them, and the characters above given ſeem ſufficient. The B. *multiflorus* has more numerous florets, more cloſely ſet, and more frequently downy, though not invariably ſo. Both kinds, with ſmooth glumes, are confounded in the collections of Buddle and Sherard, under the ſynonym of Ray which belongs to the former; as they are in the herbarium of Bobart under *Moriſ. Sect.* 8. *t.* 7. *f.* 16; but in the laſt-mentioned the glumes of B. *multiflorus*, though not downy all over, are rough on the keel.

3. BROMUS *mollis*.

Soft Brome-graſs.

B. paniculâ erectâ coarctatâ; pedunculis ramoſis, ſpiculis ovatis, floſculis imbricatis depreſſis nervoſis pubeſcentibus.

Bromus mollis. *Linn. Sp. Pl.* 112. *Curt. Lond. faſc.* 1. *t.* 8. *Mart. Fl. Ruſt. t.* 99. *Relh.* 44. *Sibth.* 47. *Leers* 37, *t.* 11. *f.* 1. *Weigel Obſ.* 7. *t.* 1. *f.* 4. *Schreb. Gram.* 60. *t.* 6. *f.* 1, 2.

B. *Linn. Hort. Cliff.* 25, ex *Herb. Cliff.*

B. polymorphus α. *Hudſ.* 48. var. 1. *With.* 159.

B. hordeaceus. *Linn. Sp. Pl. ed.* 1. 77.

B. n. 1504. *Hall. Hiſt. V.* 2. 236.

Feſtuca avenacea hirſuta, paniculis minùs ſparſis. *Raii Syn.* 413.

Gramen avenaceum pratenſe, glumâ breviore ſquamosâ et villosâ. *Moriſ. Sect.* 8. *t.* 7. *f.* 18.

β. Bromus

β. Bromus nanus. *Weigel Obſ.* 8. *t.* 1. *f.* 9. *Herb. Linn.*

In muris, aggeribus et paſcuis vulgaris. Fl. Junio.

Radix fibroſa, parùm ramoſa, albida, biennis. *Culmus* erectus, bipedalis, ſimplex, teres, ſtriatus, ſæpiùs glaber, ſubindè pubeſcens, geniculis tumidis, quandoque hirſutis. *Folia* (ut et vaginæ) ſtriata, pilis mollibus caneſcentibus villoſa, margine vix ſcabra. *Stipula* acutiuſcula, lacera. *Panicula* bi- vel tri-uncialis, erecta, coarctata, demùm patentiuſcula, decompoſita; ramis ſemiverticillatis, ſimplicibus racemoſiſque, longitudine variis, angulatis, pubeſcentibus. *Spiculæ* erectiuſculæ, ovatæ, acutæ, parùm compreſſæ, floſculis 5 ad 10, arctè imbricatis. *Calyx* e glumis duabus, inæqualibus, ellipticis, mucronatis, margine ſcarioſis, carinatis, villoſis, 7-9 nerviis, nervis viridibus, validis, extantibus. *Floſculi* calyci conformes, depreſſo-concavi, ariſtis ſcabris longitudine valvularum; *glumæ interiores* tenuiſſimæ, longèque anguſtiores, enerviæ, margine incraſſato, viridi, ciliato. *Semen* ellipticum, depreſſo-planum.

Nothing can be more diſtinct than this common *Bromus* from the two already mentioned. Its compound denſe panicle, and its ſtrongly-ribbed, depreſſed, cloſely imbricated glumes, at once diſtinguiſh it. Few plants vary more as to luxuriance. The B. *nanus* of Weigel, ſent by himſelf to Linnæus, is a ſtarved dwarf variety, with few ſpikes in the panicle, as it often grows on walls. The ſame is in Buddle's herbarium.

We are certain from the Cliffortian herbarium, now fortunately in Sir Joſeph Banks's hands, that this is the only *Bromus* mentioned in the *Hortus Cliffortianus*, though the ſynonyms there imply ſeveral

other ſpecies, and Linnæus afterwards quoted that work for B. *arvenſis*. So neceſſary is the compariſon of original ſpecimens!

I think there can be no doubt of Scheuchzer's Gr. avenaceum, locuſtis villoſis, anguſtis, candicantibus et ariſtatis, *Agr.* 254. *t.* 5. *f.* 12, being our B. *mollis*, though I have ſeen no ſpecimen under his own hand, and therefore would not quote him.

4. BROMUS *racemoſus*.

Smooth Brome-graſs.

B. panicula erectiuſcula diffuſa; pedunculis ſimplicibus, ſpiculis ovatis ſexfloris, floſculis imbricatis depreſſis nervoſis glabris.

Bromus racemoſus. *Linn. Sp. Pl.* 114.

B. polymorphus β et δ *Hudſ.* 49. var. 3 & 4. *With.* 160.

Feſtuca avenacea, ſpicis ſtrigoſioribus, è glumis glabris compactis. *Raii Syn. ed.* 2. 261. *ed.* 3. 414.

Gramen avenaceum pratenſe, gluma tenuiore glabra. *Dill. in Raii Syn. ed.* 3. 414.

G. avenaceum pratenſe, gluma ſquamoſa longiore glabra. *Moriſ. Sect.* 8. *t.* 7. *f.* 19. *Herb. Bobart.*

G. avenaceum hirſutum annuum, paniculâ ampliore magìſque ſparſâ locuſtis craſſioribus glabris et ariſtatis. *Till. Piſ.* 74. *Herb. Sherard.*

G. loliaceum alpinum, ſpicâ exili, rarioribus locuſtis. *Ponted. Comp.* 46. *Herb. Sherard.*

In pratis et paſcuis. Fl. Junio.

At Holkham, Norfolk. *Mr. Crowe.* Northamptonſhire. *Mr. Dickſon.*

Præcedente

Præcedente toto habitu gracilior. *Radix* annua. *Culmus* ferè tripedalis, glabriuſculus. *Folia* utrinque piloſa, margine parùm ſcabra. *Vaginæ* pilis plerumque deflexis hirſutæ. *Panicula* rara, diffuſa (nec coarctata), ſimplex, pedunculis femiverticillatis, ſcabris, elongatis, indiviſis, vix unquam bifloris. *Spiculæ* præcedentis, at glaberrimæ, vix ſeptemfloræ, nitidæ, viridi alboque vittatæ, nervis minùs prominentibus, ariſtis ſcabris longitudine valvularum.

Linnæus deſcribed this ſpecies from an Engliſh ſpecimen, leſs luxuriant than uſual, and therefore more ſtrictly racemoſe. The name however may be retained in alluſion to the ſimple ſtructure of the panicle. Even in the very luxuriant ſpecimen, ſent by Tilli to Sherard, the foot-ſtalks are moſtly ſimple and ſingle-flowered, by which, and the conſtant ſmoothneſs of its glumes, it may certainly be diſtinguiſhed from B. *mollis*.

We have under this graſs an inſtance of Dillenius's having inſerted, as a new ſpecies, into his edition of the *Synopſis*, what exiſted there well defined already, for his is not even a variety of Ray's plant.

Dr. Withering, by an error totally unaccountable to me, quotes Mr. Afzelius as ſaying that "the B. *ſecalinus*, *hordeaceus* and *racemoſus* are the *ſame plant* in the Linnæan herbarium, and that they are all varieties of B. *mollis*." This excellent Botaniſt muſt have ſpoken from recollection, and his memory deceived him, as any one may eaſily be convinced by looking at the ſpecimens. Nor is this the only error of the ſame kind, which, without my participation or knowledge, has glided into the work of my intelligent and liberal friend, to whom I ſhould have been happy at all times to have directly communicated all the information that might be conſiſtent with my own undertakings, which I know to be all he would ever deſire.

5. BROMUS *ſquarroſus.*

Corn Brome-graſs.

B. paniculâ nutante; pedunculis ſimplicibus, ſpiculis ovatis duodecim floris, floſculis imbricatis depreſſis, ariſtis divaricatis.

Bromus ſquarroſus. *Linn. Sp. Pl.* 112. *Hudſ.* 49. *With.* 160. *Villars Dauph. V.* 2. 115.

Feſtuca graminea, glumis vacuis. *Scheuchz. Agr.* 251. *t.* 5. *f.* 11.

Gramen phalaroides majus aceroſum, nutante ſpicâ. *Barrel. Ic. t.* 24. *f.* 1.

In arvis Angliæ auſtraliores. *Hudſ.* Fl. Julio.

Radix fibroſa, parva, annua. *Culmus* pedalis, ſimplex, glaber, ſtriatus, folioſus. *Folia* et *vaginæ* pubeſcunt, villis breviſſimis deflexis. *Panicula* pauciflora, pedunculis ſecundis, ſimplicibus, compreſſis, apice incraſſatis. *Spiculæ* omnium maximæ, ovatæ, tumidæ, nitidæ, floſculis 12 ad 16, arctè imbricatis, depreſſo-concavis, glabris, ſubinde ſcabriuſculis. *Calyx* inæqualis, nervoſus, muticus. *Glumæ corollinæ exteriores* calyce parùm majores, multinerviæ, apice bipartitæ, ariſtis ſubulatis, ſcabris, recurvato-divaricatis, longitudine glumarum; *valvulæ interiores* longè minores, ciliis raris pectinatæ. *Semen* ellipticum, depreſſo-concavum, corollæ adnatum, apice villoſum.

This deſcription is taken from ſeveral very excellent ſpecimens in the Linnæan collection, for I have never ſeen any of Britiſh growth. It owes its place, therefore, in the liſt of Engliſh plants, entirely to Mr. Hudſon, as Dr. Withering alſo remarks, and I am not without a ſuſpicion of his having miſtaken the true B. *ſecalinus* for this ſpecies.

6. BROMUS

6. BROMUS *arvenſis.*

Field Brome-graſs.

B. paniculâ patente; pedunculis ramoſis, ſpiculis lanceolatis octofloris, floſculis ellipticis imbricatis depreſſis glabriuſculis.

Bromus arvenſis. *Linn. Sp. Pl.* 113. *Fl. Suec. n.* 97. *With.* 162. *Leers* 38. *t.* 11. *f.* 3. *Villars Dauph. V.* 2. 116.

B. erectus β *Hudſ.* 50?

Feſtuca elatior, paniculis minùs ſparſis, locuſtis oblongis ſtrigoſis ariſtatis purpureis ſplendentibus. *Raii Syn. ed.* 2. 261. *ed.* 3. 414. *Herb. Sherard.*

F. graminea, effuſâ jubâ. *Scheuchz. Agr.* 262. *t.* 5. *f.* 15.

F. avenacea ſterilis elatior. *Rel. Rudb.* 15. *f.* 2.

Aegilops major, caule et foliis arundinaceis, locuſtis glabrioribus et anguſtioribus e fuſco xerampelinis. *Dill. Giſſ.* 130. *App.* 60. *Herb. Sherard.*

Gramen bromoides ſerotinum annuum, paniculâ rariore magìſque ſparſâ, locuſtis anguſtioribus, purpuraſcentibus, glabris et ariſtatis. *Till. Piſ.* 76. *Herb. Sherard.*

Inter ſegetes rariùs. Fl. Julio.

Near Southampton. *Sherard.* At Earſham, Norfolk. *Mr. Woodward.*

Radix fibroſa, parva, annua. *Culmus* tripedalis, erectus, ſimplex (baſi quandoque ramoſo-luxurians), teres, ſtriatus, glaber, folioſus, geniculis quatuor vel quinque. *Folia* patentia, acuta, ſtriata, utrinque pubeſcentia, margine parùm ſcabra, longiùs vaginata. *Vaginæ* cylindricæ, nervoſæ, moliſſimè pubeſcentes, pilis deflexis. *Stipula* breviſſima, lacera. *Panicula* erectiuſcula, multiflora, ramis

patentibus, numeroſis, ſimplicibus et ramoſis, ſcabris. *Spiculæ* ovato-lanceolatæ, erectiuſculæ, demùm nutantes, nitidæ, purpureo variæ, plerumque glabræ, ſubinde oculo armato pubeſcentes. *Glumæ calycinæ* valdè inæquales, lanceolatæ, acutæ, carinatæ, nerveſæ, margine membranaceæ. *Floſculi* 7 ad 10, arctè imbricati, elliptici, depreſſo-concavi, carinâ ſcabri, margine membranacei, nervis duobus approximatis longitudinalibus lateralibus; ariſtis glumâ plerumque longioribus, parùm infra apicem membranaceum e carinâ elongatâ exortis, rectis, ſubulatis, ſcabris: *glumæ interiores* minores, enerviæ, obtuſæ, muticæ, margine pectinatæ. *Semen* apice villoſum.

There is ſome doubt whether Mr. Hudſon really knew this graſs, or whether what he took for B. *arvenſis* of Linnæus is merely a variety, as he made it, of his B. *erectus*; and this point can never be determined. The two ſpecies have leſs reſemblance or affinity than moſt other *Bromi*, and could ſurely never be confounded.

7. BROMUS *erectus*.

Upright Perennial Brome-graſs.

B. paniculâ erectâ; pedunculis ſubſimplicibus, floſculis lanceolatis teretiuſculis, foliis radicalibus anguſtiſſimis ciliato-piloſis.

Bromus erectus. *Hudſ.* 49. *ed.* 1. 39. *With.* 160. *Sibth.* 47. *Relh. Suppl.* 2. 8. *Eng. Bot. t.* 471.

B. agreſtis. *Allion. Ped. V.* 2. 249.

B. perennis. *Villars Dauph. V.* 2. 122.

B. n. 1507. *Hall. Hiſt. V.* 2. 237. *Davall.*

Feſtuca avenacea ſterilis ſpicis erectis. *Raii Syn. ed.* 1. 237. *ed.* 2. 261. *ed.* 3. (excluſis ſynonymis) 413.

Gramen

Gramen bromoides pratenſe, foliis præter culmum anguſtiſſimis, rarâ lanugine villoſus. *Scheuchz. Agr.* 255. *t.* 5. *f.* 13. From a ſpecimen named by Scheuchzer himſelf in the Sherardian collection.

G. bromoides paniculatum, foliis et culmo villoſis. *Scheuchz. Agr.* 257. according to the opinion of Sherard.

G. quod Feſtuca pratenſis lanuginoſa C. B. *Vaill. Paris.* 93. *t.* 18. *f.* 2. The ſynonyms very much confuſed.

G. avenaceum glabrum, paniculâ purpuro-argenteâ ſplendente. *Mor. V.* 3. 213. *n.* 20. *Herb. Bobart.*

G. loliaceum, locuſtis longis ariſtatis. *Mont. Prod.* 35. *f.* 2. *Herb. Sherard.* But the ſynonyms of Ray and Moriſon quoted by Monti are wrong.

G. ſparteum, longâ et ſpicatâ paniculâ, Lolii utriculis, Feſtucæ potius, majus. *Barrel. Ic. t.* 13. *f.* 1.

In paſcuis arenoſis, cretâ ſubſtratis. Fl. Julio.

In the hedges beyond Botley near Oxford. *Bobart.* Ditchley Park. *Mr. Woodward.* Holkham, Norfolk. *Mr. Crowe.*

Radix perennis, fibroſa, cæſpitoſa, fibris villoſis, fuſcis. *Culmus* ferè tripedalis, erectus, ſtrictus, ſimplex, teres, glaber (rariùs pubeſcens), ultra medium folioſus, geniculis circiter quatuor. *Folia* lineari-lanceolata, acutiuſcula, ſtriata, lætè viridia, ſcabra; radicalia anguſtiſſima, pilis longis albis ſparſis adſcendentibus ciliata, ſubinde involuta. *Vaginæ* ſtriatæ, glabræ. *Stipula* breviſſima, eroſa. *Panicula* erecta, ramis erectis, ſcabris, numero et longitudine variis, ſimplicibus, rariùs biflоris. *Spiculæ* lineari-oblongæ, compreſſæ, erectæ, purpuraſcentes, vel glabræ vel tomentoſæ. *Glumæ calycinæ* lanceolatæ, acutæ, carinatæ; interiore majore, trinervi. *Floſculi* 5 ad 9, imbricati, lanceolati, compreſſo-teretiuſ-

culi, ſubangulati, carinati, obſoletè nervoſi, carinâ ſcabri; ariſtis longitudine vix glumarum, parùm infra apicem membranaceum exortis, rectis, ſcabris. *Glumæ interiores* apicem versùs minutè pectinato-ciliatæ ciliis adſcendentibus, minùs quam in maximâ parte Bromorum conſpicuis. *Antheræ* croceæ. *Semen* linearioblongum, ſupra ſulcatum, apice villoſum.

The ſpecimen of this *Bromus*, that ranks firſt in authority, exiſts in the Sherardian herbarium, and is thus inſcribed in Sherard's hand:

"Feſtuca avenacea ſterilis, ſpicis erectis, D. Bobart. Synopſ. App. This was firſt found by me, and given to Mr. Bobart. Folia inferiora pilis longis obſita."

Under theſe very words it appears in the ſecond edition of Ray's *Synopſis;* but, in the third, Dillenius has added ſynonyms of Plukenet and Moriſon, which belong to a widely different plant B. *muralis* of Hudſon, *madritenſis* of Linnæus, *diandrus* of Curtis, under which laſt name I ſhall preſently deſcribe it. Mr. Hudſon however copies thoſe ſynonyms under his B. *erectus*, adding, with a query indeed, B. *racemoſus* of Linnæus; ſo that he includes under *erectus* three ſpecies, and, if his variety β be the real *arvenſis*, even four. Other Botaniſts in the time of Dillenius ſeem to have confounded B. *erectus* and *diandrus;* and that circumſtance perhaps led him into the ſame error. The latter ſpecies in Buddle's herbarium has the denomination *Feſtuca avenacea ſterilis ſpicis erectis, D. Bobart*, which we have juſt proved to belong to the former, while there are three moſt diſtinct graſſes, one of them B. *erectus* with downy glumes, in the ſame herbarium under the true ſynonym of B. *diandrus*, as will be ſhewn preſently, not one of which is the real *diandrus*. Buddle has alſo the *erectus* in another place, with ſmooth glumes, with the ſynonym in Ray's *Synopſis*, which belongs

belongs to B. *arvenſis*, as above quoted. So in the Sherardian herbarium, along with authentic ſpecimens from Scheuchzer and Monti of B. *erectus*, with their own names for it, are various others, ſome with downy glumes, others with ſmooth ones, to which Sherard has applied ſuch a maſs of confuſed ſynonyms from the Bauhins, Ray and Tournefort, that they only ſerve to ſhew he had really no clear ideas upon the ſubject, and that his authority, like that of too many other Botaniſts, is not to be implicitly relied on in matters of opinion or criticiſm, however valuable in the caſe of original ſpecimens of plants found or deſcribed by himſelf.

With reſpect to Vaillant, his figure leaves no doubt of B. *erectus* being the plant he intended, though it may or may not be the *Feſtuca pratenſis lanuginoſa* of Bauhin; and his other citations are obſcure, thoſe of Ray certainly wrong.

Bromus erectus is eaſily known by its black perennial downy root, erect panicle and ſpikes, and eſpecially by the radical leaves being much narrower than thoſe on the ſtem, perfectly linear, and remarkably ciliated with diſtant long white hairs, pointing upwards. The accurate Mr. Swayne, as well as Mr. Woodward, has noticed its affinity to *Feſtuca*, to which genus I might have been tempted to remove it, on account of the perennial root, and the inner glume of the corolla being downy rather than pectinated. The *ariſta* however being, although a direct continuation of the *carina*, not ſtrictly terminal, as the glume ſeparates from it on each ſide, but more eſpecially the great affinity between this graſs and *Bromus aſper*, an indubitable *Bromus*, make me retain it in that genus.

8. BROMUS *aſper*.

Hairy Wood Brome-graſs.

B. paniculâ nutante ramoſâ, floſculis lanceolatis teretiuſculis ſubenerviis, foliis uniformibus: inferioribus hirſutis.

Bromus

Bromus aſper. *Linn. Suppl.* 111. *With.* 161. *Mart. Fl. Ruſt. t.* 126. *Retz. Prod. ed.* 2. 25.

B. ramoſus. *Linn. Syſt. Veg. ed.* 13. 102. (nec *Mant.* 34). *Hudſ. ed.* 1. 40.

B. nemoralis. *Hudſ.* 51.

B. nemoroſus. *Villars Dauph. V.* 2. 117.

B. hirſutus. *Curt. Lond. faſc.* 2. *t.* 8. *Relh.* 48. *Sibth.* 48.

B. montanus. *Pollich. V.* 1. 116. *Retz. Obſ. faſc.* 2. 7.

Poa paniculâ nutante, laxâ, ſpicis oblongis, multifloris, ſæpe ariſtatis. *Gmel. Sib. V.* 1. 110. *t.* 21. *Herb. Linn.*

Gramen avenaceum dumetorum, paniculâ ſparsâ. *Raii Syn.* 415.

G. avenaceum dumetorum, jubâ longiore, ſpicâ diviſâ. *Moriſ. Sect.* 8. *t.* 7. *f.* 27.

In nemoroſis et ſepibus, humidiuſculis. Fl. Julio.

Radix annua vel biennis, fibroſa, fibris craſſiuſculis, horizontaliter patentibus, lævibus. *Culmus* 4- vel 5-pedalis, erectus, teres, ſtriatus, folioſus, ſupernè glaber, ſub trigeniculatus. *Folia* patentia, plana, acuta, nervoſa, aſpera atque piloſa, latitudine omnia ferè æqualia. *Vaginæ* teretes, vix carinatæ, nervoſæ; inferiores pilis deflexis hirſutiſſimæ. *Stipula* brevis, lacera. *Panicula* pedalis, nutans, multiflora; ramis ramuliſque plerumque binatis, elongatis, nutantibus, aſperis. *Spiculæ* lineari-oblongæ, pendulæ, fuſco-virides, ſubpubeſcentes. *Glumæ calycinæ* valdè inæquales, lanceolatæ, carinatæ, ſcabræ; majori trinerviâ. *Floſculi* circiter novem, imbricati, demùm laxè patentes, lanceolati, teretiuſculi, carinati, obſoletè trinervii, carinâ præcipuè aſperi, margine ſcarioſi, ſub apicem ariſtati, ariſtâ glumis breviore; *glumæ interiores* crebriùs ciliatæ, margine ſcarioſo, inflexo. *Semen* ſulco exaratum.

No

No difficulty attends this ſpecies, except what ariſes from the number of names that have been given it, owing to Linnæus having by accident called another B. *ramoſus;* ſo that this requiring a new name, every perſon gave one according to his fancy. It is eaſily diſtinguiſhed from the preceding, to which, though no one has yet compared them, it is moſt nearly a-kin; but its annual, or at moſt biennial, pale ſmooth root, broad uniform hairy leaves, and branched drooping panicle, characterize it ſufficiently. Authors have laboured to diſtinguiſh it from B. *giganteus* of Linnæus, ſome having moſt careleſsly conſidered them as the ſame ſpecies. In that however the root is perennial, the ſpikes ſmall, florets fewer, nearly ovate, ſcarcely carinated, their inner valve though rough not ciliated, and their *ariſtæ*, as Villars well obſerves, terminal, for which two laſt reaſons particularly I have ventured to remove it to the *Feſtucæ*.

9. BROMUS *ſterilis*.

Barren Brome-graſs.

B. paniculâ nutante ſubſimplici, floſculis lanceolatis nervoſis ſulcatis, foliis pubeſcentibus.

Bromus ſterilis. *Linn. Sp. Pl.* 113. *Hudſ.* 50. *With.* 162. *Relh.* 46. *Sibth.* 47. *Curt. Lond. faſc.* 1. *t.* 9. *Mart. Fl. Ruſt. t.* 125. *Leers* 37. *t.* 11. *f.* 4. *Ger. em.* 76.

Feſtuca avenacea ſterilis elatior, ſeu Bromos Dioſcoridis. *Raii Syn.* 412.

F. graminea annua ſterilis, ſpicis dependentibus. *Moriſ. Sect.* 8. *t.* 7. *f.* 11.

In arvis, ruderatis et ſepibus vulgaris. Fl. Junio, Julio.

Radix

Radix annua, fibroſa, parva, fibris capillaribus. *Culmus* ſeſquipedalis, erectus, gracilis, teres, ſtriatus, ad apicem uſque folioſus, geniculis 5 vel 6. *Folia* patentia, plana, ſubflaccida, anguſta, acutiuſcula, nervoſa, utrinque molliſſimè pubeſcentia, margine ſcabriuſcula. *Vaginæ* cylindricæ, nervoſæ, molliſſimè villoſæ, pilis parùm deflexis. *Stipula* oblonga, lacera. *Panicula* ſpithamæa, nutans; ramis ſæpiùs ternis, elongatis, nutantibus, aſperis, ſimplicibus, vix unquam bifloris. *Spiculæ* lanceolatæ, pendulæ, fuſco-virentes, ſcabræ. *Glumæ calycinæ* maximè inæquales, lanceolatæ, ſcabræ; majori angulatâ, nervoſâ. *Floſculi* 6 ad 8, imbricati, demùm patentiuſculi, lanceolati, compreſſi, carinati, aſperi, 7- vel 9-nervii, nervis duobus ſubmarginalibus maximis, inter nervos ſulcati atque ſubpubeſcentes, apice ipſo ferè ariſtati, ariſtis glumâ longioribus, ſcabris; *glumæ interiores* ſetis raris pectinatæ, margine ſcarioſo inflexo. *Stamina* tria. *Semen* ſulco exaratum.

This common *Bromus* is readily known by its drooping, almoſt ſimple, flower-ſtalks, and narrow downy leaves. The ſtrong nerves of the glumes, a part hitherto generally much neglected in graſſes, are remarkable in this and the next ſpecies.

10. BROMUS *diandrus*.

Upright Annual Brome-graſs.

B. paniculâ erecto-patente ſubramoſâ, floſculis lanceolatis nervoſis ſulcatis diandris.

Bromus diandrus. *Curt. Lond. faſc.* 6. *t.*

B. madritenſis. *Linn. Sp. Pl.* 114. *With.* 161.

B. muralis. *Hudſ.* 50. *Sibth.* 48.

B. ciliatus. *Hudſ. ed.* 1. 40.

B. ſterilis,

B. ſterilis, erectâ paniculâ, major. *Barrel. Ic. t.* 76. *f.* 1.

Feſtuca avenacea ſterilis, paniculis confertis erectioribus, ariſtis brevioribus. *Raii Syn. ed.* 2. 261. *Pluk. Phyt. t.* 299. *f.* 2. *Herb. Sherard.*

F. avenacea ſterilis, pediculis brevioribus et ſpicis erectis. *Moriſ. V.* 3. 212. *n.* 13.—et F. graminea annua, ſpicis erectis. *Ejuſd. Sect.* 8. *t.* 7. *f.* 13. *Herb. Bobart.*

Gramen bromoides pumilum, locuſtis erectis, majoribus ariſtatis. *Scheuchz. Agr.* 260. Sent by Scheuchzer himſelf to Sherard.

In arenoſis et ad muros paſſim. Fl. Junio.

Common on the ſandy grounds in Jerſey. *Sherard.* At the foot of St. Vincent's rock, Briſtol, on the farther part near the meadows. *Sir J. Banks, Bart.* Near Batterſea. *Curtis.*

Radix annua, fibroſa, parva. *Culmi* pedales vel ſeſquipedales, erecti, ſtricti, graciles, teretes, ſtriati, glabri, folioſi, geniculis plerùmque tribus. *Folia* præcedentis, at minùs pubeſcentia, ſæpè omninò glabra. *Vaginæ* nervoſæ, ſubcarinatæ, ſæpiùs glabræ, quandòque piloſæ, pilis deflexis. *Stipula* brevis, eroſa. *Panicula* vix triuncialis, erecta, faſtigiata; ramis ternis, quaternis, quiniſve, ſcabriuſculis, plerùmque ſimplicibus, brevibus, unifloris, ſolo fertiliore tantùm elongatis et ramoſis, ſemper tamen erectis vel erectiuſculis, nunquam pendulis. *Spiculæ* lineari-lanceolatæ, erectæ, ſæpiùs fuſceſcentes, ſcabræ. *Floſculi* præcedentis, ſed diandri, minùſque argutè nervoſi, nervis duobus lateralibus approximatis præcipuè conſpicuis.

The eſſential character of this ſpecies conſiſts in its flower-ſtalks being ſhort and erect, leaves almoſt ſmooth, glumes much leſs

ſtrongly nerved than in the laſt, and eſpecially in its florets having but two ſtamina, which has been obſerved by Mr. Curtis, as well as by Dr. Withering who found the ſame graſs in Portugal. I have by compariſon proved it the B. *madritenſis* of Linnæus; but it being far from peculiar to Madrid, I make no ſcruple to prefer the expreſſive name *diandrus*. It is very diſtinct from the B. *rubens*. Like moſt plants that live in a ſandy ſoil, it varies greatly as to ſize.

Great obſcurity involves the early ſynonyms of this graſs, inſomuch that nothing but the inveſtigation of original ſpecimens could clear it up. The moſt important of theſe is one in the Sherardian herbarium, with a ticket inſcribed by Sherard, thus: "This I found common on the ſandy grounds in Jerſey. 'Tis ſhorter awned than the *Bromus ſterilis*, lower and more upright." Hence we learn with certainty that the plant intended by Ray, in the ſecond edition of his *Synopſis*, *p.* 261. *n.* 4. is our *B. diandrus*. We learn with equal certainty from the collection of graſſes made by Bobart, and referring all through to that part of Moriſon's *Hiſtoria*, of which he was the editor, that he knew it to be the plant of Ray, and that he intended it himſelf under the name and figure in Moriſon, to which I have referred above. Dillenius however, ſtrange to tell, in his edition of the *Synopſis*, applies theſe ſynonyms to the B. *erectus;* and under the definition which belongs to the *diandrus*, he quotes a paſſage in Petiver's *Concordia Graminum*, and gives a figure and deſcription of his own, all which apply to *Feſtuca uniglumis* of Solander, *Lolium bromoides* of Hudſon, which is the plant Dillenius found on the coaſt of Suſſex, and, as it appears from Buddle's herbarium, what Mr. Dale gathered in Merſey Iſland. This error of Dillenius is noticed on a ticket, which accompanies the genuine ſpecimen of B. *diandrus* in the Sherardian collection, on which is written, in a ſcrawling hand unknown to me,

me, but certainly neither Dillenius's, Sherard's, nor Buddle's, the proper reference to Ray's ſecond edition, and Plukenet, *t.* 299. *f.* 2. with a remark in Latin, that "another graſs is exhibited for this in the *Synopſis*," that is in the third edition. Yet with this are two poor ſpecimens of the ſame graſs, marked with the original definition of Bobart, and the reference to the Appendix to Ray's firſt edition, p. 237, which belongs to B. *erectus*, as I have already mentioned. This is written in a handſome hand, to which I am likewiſe a ſtranger. A more complicated blunder exiſts in Buddle's herbarium. Under the inſcription "Feſtuca avenacea ſterilis, paniculis confertis erectioribus, ariſtis brevioribus, D. Sherard, *Raii Syn.* 261," are three moſt diſtinct and diſſimilar plants. In the firſt place *Bromus ſcoparius* of Linnæus, next B. *erectus* with downy glumes, and laſtly *Feſtuca uniglumis*, under which laſt is written (by Buddle as well as the reſt) "collectum in inſ. Merſea propè Colceſtr. a D. Dale, R. H. 1287." So that there is only wanting the real graſs to which the ſaid inſcription properly belongs. I was once inclined, on this authority, to add B. *ſcoparius* to the Britiſh Flora; but as there is no proof in Sherard's own collection of his having found it in Jerſey, we muſt ſuppoſe Buddle had it from ſome other quarter, and, merely from his own judgment, referred it to the plant of Sherard and Ray.

From the above tedious but neceſſary detail, I truſt the confuſion of ſynonyms between B. *erectus* and B. *diandrus*, which exiſts in Hudſon and all other writers who have touched upon them, will be accounted for, and in ſome meaſure excuſed, though it muſt be confeſſed the author of the *Flora Anglica* had the means in his power of clearing it up, had he been ſufficiently attentive. It will alſo appear from the hiſtory of ſuch miſtakes, which are abundant throughout every Britiſh *Flora* we have yet ſeen, that the comple-

tion of a more perfect one is not the work of a day. Indeed the contemplation of them, and the certainty that in ſo intricate an undertaking ſimilar errors are ſcarcely to be wholly avoided, are ſometimes ſufficient to daunt the moſt ardent inveſtigator, and make him ſenſible how much he himſelf may need the correction and indulgence of future critics.

II. BROMUS *ſylvaticus.*

Slender Wood Brome-graſs.

B. ſpicâ ſimplici nutante ſecunda, ſpiculis ſeſſilibus teretiuſculis, ariſtis glumâ longioribus, foliis piloſis.

Bromus ſylvaticus. *Pollich. V.* 1. 118. *Pourret Act. Toloſ. V.* 3. 308.

B. pinnatus. *Fl. Dan. t.* 164.

B. gracilis. *Weigel Obſ.* 15. *t.* 1. *f.* 11.

Feſtuca ſylvatica. *Hudſ. ed.* 1. 38. *With.* 158. *Relh.* 44. *Sibth.* 46. *Lightf.* 103. *Mart. Fl. Ruſt. t.* 114. *Dickſ. H. Sicc. faſc.* 13. 9.

F. pinnata β. *Hudſ.* 48.

Triticum n. 1432. *Hall. Hiſt. V.* 2. 213.

Gramen avenaceum dumetorum ſpicatum. *Raii Syn.* 394.

In dumetis, nemoroſis, et ſepibus frequens. Fl. Julio.

Radix perennis, fibroſa, cæſpitoſa, fuſca. *Culmi* bipedales, erecti, ſimplices, teretes, folioſi, glabri, apice attenuati et inclinati. *Folia* patentia, latiuſcula, acuminata, rigidiuſcula, lætè viridia, ſcabra, nervoſa, ſubtùs præcipuè ſtriata, magis vel minùs piloſa. *Vaginæ* ſtrictæ, ſtriatæ, piloſæ. *Stipula* brevis, obtuſa, lacera. *Spica* ſimplex, nutans, ferè triuncialis, rachi ſubflexuosâ, ſtriatâ, ſcabrâ,

ſcabrâ, hinc canaliculato-compreſsâ. *Spiculæ* 6 vel 7, alternæ, ſeſſiles, ſecundæ, non divaricatæ, lineari-lanceolatæ, luteolo-virides plerùmque pubeſcentes. *Glumæ calycinæ* inæquales, lanceolatæ, breviùs ariſtatæ, nervoſæ, apicem versùs hirtæ. *Floſculi* 6 ad 9, imbricati, demùm patentiuſculi, ſubcylindrici, apicem versùs præcipuè nervoſi atque hirti. *Ariſta* terminalis, glumis plerùmque longior, ſubulata, ſcabra. *Gluma interior* linearis, retuſa, ſetis erectis rigidis ciliata.

The inner glume being ſtrongly pectinated in this graſs and the following one, ſeems to me a ſure indication of their being *Bromi*, and that any thing to the contrary in the inſertion of the *ariſta*, being in many ſpecies very difficult to determine, and in ſome variable, is of leſs real moment. In habit alſo theſe plants agree with other *Bromi* rather than with *Feſtucæ*, except indeed their perennial roots.

12. BROMUS *pinnatus.*

Spiked Heath Brome-graſs.

B. ſpicâ ſimplici erectâ diſtichâ, ſpiculis ſeſſilibus teretiuſculis, ariſtis glumâ brevioribus, foliis nudiuſculis.

Bromus pinnatus. *Linn. Sp. Pl.* 115. *Hudſ. ed.* 1. 41. *Pollich. V.* 1. 117. *Weigel Obſ.* 14. *t.* 1. *f.* 10.

Feſtuca pinnata. *Hudſ.* 48. *Relh.* 44. *Sibth.* 46. *Dickſ. H. Sicc. faſc.* 13. 8.

Triticum n. 1431. *Hall. Hiſt. V.* 2. 212.

Avena læta. *Saliſb. Prod.* 22.

Gramen ſpicâ Brizæ majus. *Raii Syn.* 392. *Rel. Rudb.* 11. *f.* 2.

G. ſparteum, ſpicatâ Brizæ paniculâ et corniculatâ. *Barrel. Ic. t.* 25.

In campis et ericetis, ſolo calcareo. Fl. Julio.

Not uncommon in Yorkſhire, Oxfordſhire and Kent.

Radix

Radix perennis, fibroſa, ſubrepens. *Culmus* ſeſquipedalis vel bipedalis, erectus, ſimplex, teres, folioſus, glaberrimus, apice rectus et rigens, parùmque attenuatus. *Folia* erectiuſcula, lanceolata, acuminata, rigidula, ſtriata, nervoſa, ſcabra, ſæpiùs nuda, rariùs ſuprà piloſa. *Vaginæ* ſtrictæ, ſtriatæ, glaberrimæ. *Stipula* brevis, obtuſa, ciliata. *Spica* ſimplex, erecta, longitudine varia, rachi ſubflexuosâ, ſtriatâ, angulis ſcabrâ, hinc complanatâ. *Spiculæ* 6 ad 10, alternæ, ſeſſiles, diſtichæ nec ſecundæ, erectæ, linearilanceolatæ, pubeſcentes. *Glumæ calycinæ* parùm inæquales, lanceolatæ vel ſubovatæ, ſubariſtatæ, multinervoſæ, margineque præcipuè hirtæ. *Floſculi* 6 ad 12, vel etiam plures, arctè imbricati, ſubcylindrici, apicem versùs præcipuè nervoſi atque hirti. *Ariſta* terminalis, glumis plerùmque brevior, quandòque etiam breviſſima, ſubulata, ſcabra. *Gluma interior* retuſa, ſetis erectis ciliata ut in præcedente.

This has been united, by many Botaniſts, with the laſt, to which it is certainly nearly allied; but there are ſeveral points of difference which ſeem to keep them diſtinct. Theſe are the erect diſtichous ſpike, the firmer habit, leſs hairy leaves, and ſhort awns of B. *pinnatus*.

XXIV. *Some*

XXIV. *Some Corrections of the general Deſcription of Polytrichum rubellum, p. 79, with an Account of another new Species of the ſame Genus. By Mr. Archibald Menzies, F.L.S.*

Read March 6, 1798.

IN the general deſcription of *Polytrichum rubellum*, at page 79, line 8 from the bottom, *for* "an inch to two inches," *read* "half an inch to about an inch." At page 80, line 1, *for* "from an inch to an inch and half," *read* "about an inch;" and in line 6, *for* "long and ſubulate," *read* "flat, but in the centre ſlightly pointed."

Theſe miſtakes happened in conſequence of my having conſidered the following from New Zeeland, on a ſlight compariſon, to be the ſame: but in examining more perfect ſpecimens, ſince the paper on the genus *Polytrichum* went to the preſs, I have been induced to make it a diſtinct ſpecies, which ought to have come in between P. *rubellum* and P. *dentatum*; but which I now beg leave to add:

14—15. POLYTRICHUM *ſubulatum*, fol. lanceolatis carinatis cartilagineo-ſerratis dorſo denticulatis, capſulis cylindricis erectiuſculis, operculo ſubulato. TAB. 6. FIG. 5.

Hab. in Nova Zeelandia. Nelſon.

This

This ſpecies was found amongſt the duplicates of Mr. Nelſon's collection of plants from New Zeeland, in Sir Joſeph Banks's Herbarium; and as it agrees ſo nearly with P. *rubellum*, perhaps the beſt manner of deſcribing it is to point out the difference.

The *ſtalk* of this is ſlightly branched, and in general taller than P. *rubellum*. The *leaves* are larger and more acutely lanceolate, with whitiſh edges finely ſerrated, and middle nerves ſtrongly dentated; their texture is more tender and fragile; their colour in the dried ſtate is the ſame, but whether they are reddiſh, like the others, in their recent ſtate, is uncertain; they are more crowded at the tops and about the diviſions of the branches. The *peduncles* in general are at leaſt half an inch longer, and terminate both the upper and lower branches; but the moſt remarkable difference is in the *operculum* being long and ſubulate, whilſt in the other it is flat, with a ſmall point iſſuing from its centre. The *capſule*, in this, is longer and more ſlender, and the exterior *calyptra* is of a ſubulate ſhape, whilſt in the other it is of a conical figure.

END OF THE FOURTH VOLUME.

DIRECTIONS

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J. C. Bowring.

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